

**IN THE UNITED STATES DISTRICT COURT FOR THE  
WESTERN DISTRICT OF OKLAHOMA**

RICHARD GLOSSIP, <i>et al.</i> ,	)	
	)	
Plaintiffs,	)	
	)	
vs.	)	Case No. CIV-14-665-F
	)	
RANDY CHANDLER, <i>et al.</i> ,	)	
	)	
Defendants.	)	

**PLAINTIFFS' POST-TRIAL FILING PURSUANT TO MARCH 7, 2022 ORDER**

Harry P. Cohen (admitted *pro hac vice*)  
Michael K. Robles (admitted *pro hac vice*)  
James K. Stronski (admitted *pro hac vice*)  
Adam Singer (admitted *pro hac vice*)  
Kenton Walker (admitted *pro hac vice*)  
Anne Li (admitted *pro hac vice*)  
CROWELL & MORING LLP  
590 Madison Avenue  
New York, NY 10022

Alex Kursman  
Lynne Leonard  
Shawn Nolan  
Assistant Federal Defenders  
Capital Habeas Unit  
Federal Community Defender Office for  
the Eastern District of Pennsylvania  
601 Walnut Street  
Philadelphia, PA 19106

Emma V. Rolls  
Office of the Federal Public Defender  
for the Western District of Oklahoma  
215 Dean A. McGee Ave., Suite 707  
Oklahoma City, OK 73102

COUNSEL FOR PHILLIP HANCOCK

Jon M. Sands  
Federal Public Defender  
District of Arizona  
Jennifer M. Moreno  
Assistant Federal Public Defender  
850 West Adams Street, Suite 201  
Phoenix, Arizona 85007

COUNSEL FOR PLAINTIFFS

May 9, 2022

**TABLE OF CONTENTS**

<b>I.</b>	<b>SYNOPSIS OF PLAINTIFFS’ EXPERT WITNESSES .....</b>	<b>1</b>
A.	Lawrence H. Block, Ph.D.....	1
B.	David H. Sherman, Ph.D.....	2
C.	Mark A. Edgar, M.D. ....	3
D.	Craig W. Stevens, Ph.D.....	11
E.	Gail A. Van Norman, M.D.....	20
F.	Michael L. Weinberger, M.D.....	28
G.	James S. Williams, M.D.....	37
<b>II.</b>	<b>CRITIQUES OF DEFENDANTS’ EXPERT WITNESSES .....</b>	<b>41</b>
A.	Joseph F. Antognini, M.D. ....	41
B.	Daniel E. Buffington, PharmD.....	51
C.	Ervin Yen, M.D. ....	55
<b>III.</b>	<b>PROPOSED FINDINGS OF FACT BASED ON FACT WITNESS TESTIMONY (Spencer Hahn, Julie Gardner, Meghan LeFrancois, Scott Crow and Justin Farris) .....</b>	<b>64</b>
A.	The Executions of Alabama Prisoners Willie B. Smith III and Ron Smith.....	64
B.	The Execution of John Grant .....	67
C.	The ODOC Director Has Unfettered Discretion to Modify the Execution Protocol .....	71
D.	The “Consciousness Check” in the Execution Protocol Is Illusory .....	74
E.	ODOC Has Demonstrated Its Inability to Adhere to the Execution Protocol .....	76

F.	The Evidence Demonstrates that the ODOC Training Has Been Inadequate. ....	78
G.	ODOC Can Conduct Executions By Firing Squad .....	78
H.	ODOC Has Not Demonstrated Reasonable Efforts to Locate Fentanyl or Pentobarbital.....	78

**PLAINTIFFS' POST-TRIAL FILING PURSUANT TO MARCH 7, 2022 ORDER**

Pursuant to the Court's March 7, 2022, Minute Entry (Doc. 637), Plaintiffs hereby respectfully submit their post-trial filing.

**I. SYNOPSES OF PLAINTIFFS' EXPERT WITNESSES**

The following is a recap of the specific points to be derived from the testimony of each expert called by the Plaintiffs:

**A. Lawrence H. Block, Ph.D.<sup>1</sup>**

1. Dr. Block has been a compounding chemist and professor since 1975. Tr. 17.
2. Compounding involves taking a chemical and mixing it with other ingredients to make it usable for its intended purpose – it is not about chemical reactions. Tr. 24.
3. Pentobarbital, once compounded for use, can remain stable over time. Tr. 54.
4. Compounding pentobarbital requires a knowledge of basic chemistry. Any pharmacist with an accredited PharmD degree would have the requisite knowledge to compound pentobarbital. Tr. 67.

---

<sup>1</sup> A transcript of the designated deposition testimony as agreed to by the parties is attached hereto for the Court's convenience as Attachment 1.

**B. David H. Sherman, Ph.D.**

1. Dr. Sherman has been a medicinal chemist since 1991. Tr. 161; Pl. Ex. 600. He also has a biotech company whose business is to discover new drugs. *Id.* at 163.

2. Dr. Sherman concludes that pentobarbital and thiopental are simple chemicals that are straightforward to synthesize and that can be scaled and produced in large quantities readily, easily and inexpensively. Tr. 164.

3. Dr. Sherman testified that the component materials are inexpensive and readily available. Tr. 168.

4. Dr. Sherman also states that the expertise necessary to synthesize these chemicals at a scale necessary for lethal injection can be done by someone with an undergraduate level of skill in chemistry. Tr. 164. He further stated that it would take about a day to do. Tr. 169-170.

5. Dr. Sherman also states that the expertise necessary to synthesize these chemicals at a scale necessary for lethal injection can be done at locations in Oklahoma, including Oklahoma State University and private companies. Tr. 164-165; 169; 173.

**C. Mark A. Edgar, M.D.**

1. Dr. Mark Edgar is a board-certified anatomic pathologist and neuropathologist and the Director of Autopsy Pathology at Mayo Clinic Florida. Tr. 186-187.

2. Dr. Edgar has personally conducted hundreds of autopsies throughout the course of his career. Tr. 188. He also regularly reviews the work of other pathologists. Tr. 188.

3. Hospital autopsies are typically completed within 48 hours from the time of death. Tr. 191. The College of American Pathologists requires hospitals to issue preliminary autopsy findings within 48 hours of the time of death. Tr. 192. A final diagnosis, which includes the results of all special studies that might be done, usually comes out within 60 days. Tr. 192.

4. To form his opinions in this case, Dr. Edgar reviewed final autopsy reports from prisoners executed in various states that use midazolam as part of their lethal injection execution protocols. Tr. 192. The autopsy reports varied in content and style because they were done by “different examiners with different training and experience from different states.” Tr. 208.

5. Prior to reviewing these autopsy reports, Dr. Edgar expected he would find all the internal organs would be normal weight, consistent with a death which happens “suddenly, as it would in someone dropping dead from a ruptured aneurysm.” Tr. 193. Instead, he was “surprised to find that the lungs were heavy in essentially all the cases,” and that “in the vast majority pulmonary edema was described.” Tr. 193. Dr. Edgar

tabulated his findings in a chart noting, for each autopsy report, the weight of the lungs and degree of pulmonary edema. Tr. 193-194; Pl. Ex. 724 at 17001-06.

6. In addition to reviewing autopsy reports, Dr. Edgar personally conducted the autopsy of Robert Van Hook, who was executed in Ohio. Tr. 196. Mr. Van Hook's lungs were very heavy and edematous and filled with fluid, and when Dr. Edgar cut into them with a knife, the water spilled out onto the table. Tr. 197.

7. Pulmonary edema refers to excess fluid in the lungs. Tr. 197. When pulmonary edema arises due to a heart problem, it is known as cardiogenic, and it may be reversible. Tr. 197. By contrast, noncardiogenic pulmonary edema is caused by a chemical or physical problem other than the heart. Tr. 197. Noncardiogenic pulmonary edema happens most commonly in situations where the lungs have become severely damaged. Tr. 197.

8. "Pulmonary edema is experienced clinically on a spectrum that varies from mild to severe." Tr. 198. As it becomes more severe, persons experiencing pulmonary edema begin to feel "a sense of doom, a sense of panic, terror, drowning, asphyxiation on the severe end." Tr. 198.

9. Dr. Edgar characterizes the pulmonary edema that occurs during an execution as "fulminant," meaning acute and severe. Tr. 199. The pulmonary edema is necessarily acute because it happens within only a few minutes. Tr. 199. It is severe because "the lungs are very heavy and very filled with fluid and there's foam coming out of the airways." Tr. 199.

10. Pulmonary edema is a common finding in autopsies from drug overdose deaths. Tr. 201. Dr. Edgar encounters pulmonary edema in about 50 percent of all autopsies. Tr. 201. Gross pathological evidence of pulmonary edema includes heavy lungs that are edematous, meaning that fluid flows out of the lungs when they are sectioned or comes out when the lungs are squeezed. Tr. 201. Fulminant pulmonary edema includes not only fluid in the lungs, but also froth in the airways. Tr. 201.

11. The average weight of one human lung is between 350 and 450 grams. Tr. 202. “[I]f a lung has normal weight, it would be very hard for it to have significant pulmonary edema.” Tr. 202. A “heavy lung is a sick lung.” Tr. 203. A heavy lung is often caused by congestion (meaning it is filled with too much blood), a tumor, or scarring. Tr. 203.

12. Pulmonary edema can be “a subtle finding” in an autopsy. Tr. 203. Even if there is no mention of pulmonary edema in a given autopsy report, Dr. Edgar cannot conclude with certainty there was no pulmonary edema. Tr. 203-204.

13. There is no published literature on autopsy results from decedents who have been injected with 500 milligrams or more of midazolam. Tr. 205.

14. Doctors can have sufficient experience in medicine to draw conclusions without relying on any published literature. Tr. 206. In other words, doctors sometimes perform their own “studies” based on careful repeat observations, which they may eventually either publish or not. Tr. 206-207.

15. Dr. Edgar reviewed 32 autopsy reports to form his opinion in this case. Of those reports, Dr. Edgar classified 27 as showing evidence of pulmonary edema. Tr. 208-



209. To make this classification, Dr. Edgar “looked for explicit evidence of pulmonary edema and excluded cases that were just said to have lung congestion.” Tr. 209. He explained that he “wanted to see explicitly the statement ‘Lungs are edematous’ or ‘Fluid is flowing from the lungs when they are squeezed’ or ‘There’s froth in the airways,’ some kind of morphologic finding that’s unequivocal for pulmonary edema.” Tr. 209.

16. Pulmonary edema was not explicitly ruled out in any of the remaining five reports Dr. Edgar classified as not showing evidence of pulmonary edema. Tr. 209. It is possible pulmonary edema was not looked for in these autopsies, or that it was not looked for carefully or by microscopy. Tr. 212. Pulmonary edema therefore cannot be definitively ruled out in the reports Dr. Edgar classified as not showing evidence of pulmonary edema. Tr. 212.

17. The chart tabulating Dr. Edgar’s findings was admitted into evidence at trial as Exhibit No. 660. Tr. 213-214. For each entry in the chart, Dr. Edgar endeavored to copy words verbatim from the autopsy report, and he highlighted evidence showing froth in the airways and edema. Tr. 214-215, 218.

18. Evidence of froth indicates that pulmonary edema must have occurred while the prisoner was still alive and breathing. Tr. 214, 216-217.

19. Dr. Edgar has no reason to believe that any of the prisoners whose autopsies he reviewed suffered from pulmonary edema prior to their executions, which leads him to conclude that the pulmonary edema developed during the executions. Tr. 217.

20. “Almost all” the autopsies Dr. Edgar reviewed were performed “the same day or the following day” of the execution. Tr. 263. Dr. Edgar did not find any connection between the presence or absence of froth and the postmortem interval. Tr. 263.

21. Dr. Edgar reviewed the autopsy report of Mr. Bigler Stouffer, who was executed by the state of Oklahoma on December 9, 2021, and concluded that Mr. Stouffer suffered pulmonary edema during his execution. Tr. 265 (citing Pl. Ex. 807).

22. Dr. Edgar reviewed the autopsy report of Mr. John Grant, who was executed by the state of Oklahoma on October 28, 2021, and concluded that Mr. Grant suffered pulmonary edema during his execution. Tr. 265-266 (citing Pl. Ex. 803).

23. Mr. John Grant’s autopsy report noted an “intramuscular hemorrhage” on the tongue, which Dr. Edgar described as “certainly . . . not a usual finding in an autopsy,” though it is “seen in victims of fires, it’s seen in drownings sometimes, and it’s sometimes seen in asphyxia from a variety of causes.” Tr. 267 (quoting Pl. Ex. 803).

24. Evidence from the four recent executions in Oklahoma has led Dr. Edgar to consider negative pressure pulmonary edema as being “a contributor to pulmonary edema or potentially the most important cause of it.” Tr. 268. Negative pressure pulmonary edema is a type of noncardiogenic pulmonary edema that occurs when a person tries to breathe in against an obstruction, thereby creating a partial vacuum that sucks fluid out of the capillaries and into the airways and air spaces of the lung. Tr. 268-269.

25. Evidence from the four recent executions in Oklahoma has reduced Dr. Edgar’s confidence in his earlier theory that the pulmonary edema might be caused by an

acidic injury to the capillaries of the lungs when midazolam is injected in a high volume and at a rapid pace. Tr. 270-272.

26. Although he cannot explain the mechanism with certainty at this point, Dr. Edgar holds an opinion to a reasonable degree of medical certainty that midazolam is causing the pulmonary edema that develops during executions under Oklahoma's three-drug protocol. Tr. 273.

27. Regardless of the mechanism that causes it, the effects and impact of pulmonary edema are the same. Tr. 273-274.

28. Dr. Edgar explains his conclusions using the following four points:

- a. Autopsy lungs show pulmonary edema, frequently with airway froth.
- b. Froth production requires breathing.
- c. Breathing stops with the onset of the paralytic.
- d. No froth production occurs following onset of the paralytic; therefore, the froth must have been produced at some point during the administration of the midazolam.

Tr. 275.

29. Froth production requires breathing because fluid, air, and a detergent will not produce bubbles without agitation; at least some energy is required to produce bubbles or froth from these three ingredients. Tr. 276-277.

30. In the Said, et al., study, pulmonary edema was induced in dogs who had some lobes of their lungs aerated and others clamped. Tr. 277 (citing Pl. Ex. 816). Foam or froth did not occur in the clamped lungs, but it did occur in the ventilated lungs. Tr.

277-278. This study shows that edematous lungs that have “breathing activity or ventilation or aeration . . . can develop froth, but lungs or lung lobes that are not ventilated, that do not have breathing activity, will not develop froth.” Tr. 277.

31. The presence of froth or foam in the airways in autopsies of executed prisoners shows that pulmonary edema must form during the administration of midazolam in the three-drug protocol because it is “only during the midazolam phase that breathing is taking place, some kind of breathing, whether it’s obstructed or partially obstructed or not obstructed.” Tr. 278.

32. Dr. Edgar does not know precisely how long it takes for pulmonary edema to develop during an execution, but he is certain it occurs after the administration of midazolam and before the administration of vecuronium bromide. Tr. 278-279.

33. An autopsy photograph of Mr. John Grant’s lung shows froth in the airway, which means that he developed pulmonary edema prior to the onset of the paralytic that stops breathing activity. Tr. 280 (citing Pl. Ex. 37 at 106).

34. Dr. Edgar concludes to a reasonable degree of medical certainty that there is “at least an 85 percent chance” that a prisoner given 500 milligrams of intravenously injected midazolam pursuant to Oklahoma’s execution protocol will develop pulmonary edema. Tr. 280.

35. The pulmonary edema in most cases Dr. Edgar reviewed was “severe,” so he would expect those prisoners felt “a sense of impending doom of asphyxiation, of drowning, of terror, all of those things, made worse by lying supine on a gurney.” Tr. 281. “[T]he experience of pulmonary edema is worsened by lying supine because it exposes a

greater volume of the lungs to the edema fluid, so being supine and being trapped supine would accentuate the sensations.” Tr. 281-282.

36. Pulmonary edema is a common finding in drug overdose autopsies because “in general, drug overdoses result in depression of respiration. . . . And breathing slows. And as a result, the amount of oxygen in the blood decreases. And as a result of that, the heart beats less effectively, and you tend to get cardiogenic pulmonary edema.” Tr. 283-284. “[M]idazolam does not cause that kind of respiratory depression, as a rule. It’s not a reliable result of midazolam.” Tr. 319.

37. Although it is not impossible for midazolam to cause respiratory depression, that is not an expected effect of midazolam and is “quite uncommon.” Tr. 297.

38. Assuming that prisoners are not rendered insensate by the time the pulmonary edema develops, they will feel its effects. Tr. 284.

39. Dr. Edgar agrees with Defendants’ expert, Dr. Yen, that one of the potential causes of pulmonary edema during executions is negative air pressure caused by a blocked airway that causes fluid to infiltrate into the lungs. Tr. 299.

**D. Craig W. Stevens, Ph.D.**

1. Dr. Craig Stevens is a professor of Pharmacology at Oklahoma State University Medical School. Tr. 8-9. He has served as an expert for states and prisoners in lethal injection litigation. *Id.* at 11-12. Dr. Stevens' opinion is that midazolam cannot prevent the pain and suffering of the second and third drugs in Oklahoma's lethal injection protocol. *Id.* at 14.

**Midazolam's Mechanism of Action**

2. Midazolam is in a class of drugs known as benzodiazepines. *Id.* at 15. Other benzodiazepine medications include Valium and Xanax. *Id.* Benzodiazepines work by binding to GABA receptors. *Id.* at 20.

3. GABA receptors sit on a cell or neuron and bridge the inside and outside of the cell. *Id.* at 19. GABA, which is the major inhibitory neurotransmitter in the brain, binds to GABA receptors. *Id.* When the GABA receptor is activated by GABA, it opens up a little channel and allows chloride ions through the channels of the GABA receptor. *Id.* at 19-20. When this happens, neuronal activity is decreased. *Id.* at 21. This in turn causes sedation. *Id.*

4. Midazolam works by potentiating the action of the GABA at the GABA receptor. *Id.* at 22. When GABA is present at the GABA receptor, midazolam causes greater inhibition because it allows a greater flow of the chloride ion through the channel of the GABA receptor. *Id.* at 22-23. Midazolam can work only if GABA is present at the GABA receptor. *Id.* Midazolam cannot work if GABA is not present at the GABA receptor. *Id.* at 22.

5. Therefore, if a benzodiazepine binds to a GABA receptor and there is no GABA bound to that receptor, there will be no effect from that benzodiazepine. *Id.* at 27. GABA is not bound to each GABA receptor because there are a lot more GABA receptors than GABA available in the body to bind to those receptors. *Id.* Additionally, at some point, all of the GABA receptors will be saturated with the benzodiazepine – meaning each receptor, even those without GABA bound, will have a benzodiazepine bound to it. *Id.* at 29. “So anytime you have benzodiazepines that are in greater concentration at the receptors than GABA, that’s just wasted drugs[.]” *Id.* That is described as a ceiling effect – greater doses do not produce greater effect. *Id.* at 30.

**Midazolam has a ceiling effect  
that occurs before general anesthesia is achieved.**

6. It is accepted in the field of pharmacology that midazolam, and all benzodiazepines, have a ceiling effect. *Id.* There are studies in humans, in animals, and in petri dishes all showing midazolam’s ceiling effect. *Id.* at 45. Based on studies relied on by both Plaintiffs’ and Defendants’ experts, Dr. Stevens believes that the ceiling effect occurs at a dosage of approximately 20-30 milligrams for a 100 kilogram person. *Id.* at 31. At the dose in which the ceiling effect occurs, general anesthesia cannot be achieved with midazolam. *Id.* Because the ceiling effect occurs before general anesthesia can be obtained, there is no dose at which midazolam can achieve general anesthesia. *Id.* at 59.

7. One of the studies that Dr. Stevens relied on in forming his opinion that midazolam has a ceiling effect at .2 to .3 mg/kg is a study performed on humans published in 2010 in the Journal of Anesthesia, titled: Electroencephalographic response following

midazolam-induced general anesthesia: relation to plasma and effect-site midazolam concentrations by Miyake, et. al.. *Id.* at 31; Pl. Ex. 344 (“Miyake”). The authors of the *Miyake* study initially gave .2 mg/kg of midazolam to its subjects and observed a certain decrease of brain activity on the EEG. *Id.* at 33-34. The authors then administered fifty percent more midazolam to each subject, raising the dosage to .3 mg/kg, and observed that the sedation of the subjects did not go any lower. *Id.* at 34. “[T]hat’s the classic pharmacological definition of a ceiling effect: increase the dose, no greater effect.” *Id.*

8. The authors in the *Miyake* study concluded that the “results are consistent with those reported earlier showing that BIS decreased only to 70 by the end of continuous infusion of midazolam at .03 mg kg per minute for 10 minutes and that the maximum effect of midazolam on the BIS is approximately 70.” *Id.* at 34-35; Pl. Ex. 344 at 5. The finding that the maximum effect of midazolam on the BIS is approximately 70 is important because in many hospitals, anesthesiologists want the BIS to fall between 60 and 40 for surgical procedures. *Id.* at 35. A BIS score of 100 means the subject is fully awake, and a BIS score of zero means the subject is brain dead. *Id.* A BIS score of 70 is not low enough for general anesthesia, and means the subject is still aware and responsive to painful stimulation. *Id.*

9. The authors of the *Miyake* study further concluded that the BIS score does not decrease further even if its plasma concentration increases to levels higher than that required for sedation. *Id.* at 35; Pl. Ex. 344 at 5. This means that even if with higher concentrations of midazolam in the blood, there is still no greater effect. *Id.* at 36.



10. Dr. Stevens also relied on the study, “The effect of midazolam on the end-tidal concentration of isoflurane necessary to prevent movement in dogs” by Reza Seddighi, et. al., published in 2011 in the Journal of Veterinary Anesthesia and Analgesia. *Id.* at 37; Pl. Ex. 428. The authors of the *Seddighi* study found that doses greater than 10 mg/kg per minute of midazolam did not further decrease the MAC, indicated a ceiling effect. *Id.* at 39; Pl. Ex. 428 at 1.<sup>2</sup> Dr. Stevens explained that this again shows “the classic pharmacological definition of a ceiling effect: Greater dose does not give greater effect[.]” *Id.* at 40.

11. Dr. Stevens also relied on a study published in the Journal for Molecular Pharmacology, titled “Distinct Functional and Pharmacological Properties of Tonic and Quantal Inhibitory Postsynaptic Currents Mediated by  $\gamma$ -Aminobutyric Acid Receptors in Hippocampal Neurons” by Donglin Bai, et al. *Id.*; Pl. Ex. 64. The *Bai* authors studied neurons in a dish. *Id.* at 41. The authors found that midazolam has a ceiling effect. *Id.* The authors compared midazolam to propofol, which is a complete anesthetic, and showed that at the molecular level, midazolam has a ceiling effect whereas the effects of propofol keep going “up and up.” *Id.* at 43; Pl. Ex. 64 at 6 (charts B & D). *Bai* further noted that “An overdose of midazolam . . . is rarely fatal, suggesting a ceiling effect.” Pl. Ex. 64 at 10. Dr. Stevens explained that the authors in *Bai* are simply saying that these molecular

---

<sup>2</sup> General Anesthetics are measured by concentrations called the MAC. Tr. 38. Midazolam reduced the MAC of the general anesthetic isoflurane needed to be given to reduce movement in dogs. *Id.* at 38-39. The first dose of midazolam did cause less MAC of isoflurane, but as the authors administered higher doses of midazolam, it did not change the MAC needed of isoflurane, which is due to a ceiling effect of Midazolam. *Id.* at 39.

studies correlate with what we see in humans: that midazolam is not potent enough and it has a ceiling effect, and therefore it is not fatal. Tr. 44.

12. Other studies illustrate that benzodiazepines have no fatal dose. *Id.* at 48-49; Pl. Ex. 56 (Benzodiazepine Overdosage: Plasma Concentrations and Clinical Outcome, Divoll, et al, Journal of Psychopharmacology, 1981) (“*Divoll*”). Although the FDA label says that midazolam can cause death, it is extremely rare. Tr. 135-36. In *Divoll*, some of the subjects consumed the equivalent of 400 mg of midazolam, *Id.* at 50, had a benzodiazepine concentration in their blood that would be equivalent to 2,400 to 3,600 nanograms per milliliter of midazolam, yet they were able to talk and respond. *Id.* at 50-51. In comparison, autopsy reports of recent executions in Oklahoma show that executed inmates had 1,600 nanograms per milliliter (Pl. Ex. 807 at 10, autopsy report of Bigler Joe Stouffer), and 2,200 nanograms per milliliter (Pl. Ex. 803 at 11, autopsy report of John Grant) of midazolam in their blood. *Id.* at 52, 54. Thus, the *Divoll* study, in which subjects, who were only minimally sedated, had a higher blood concentration of benzodiazepines than prisoners autopsied after lethal injection procedures, provides further evidence that Oklahoma’s lethal injection protocol cannot produce general anesthesia. *Id.* at 54.

13. In a clinical setting, midazolam is used as a sedative hypnotic agent or for conscious sedation. *Id.* at 15, 17. It is also used for induction of anesthesia. *Id.* at 17. Induction is not the same as maintenance of anesthesia. *Id.* at 18. It is not a state in which you can perform surgery or make cuts on an individual. *Id.*

14. Even though there are not studies using a 500 mg dose of midazolam, science and the studies cited above inform us that in a 100kg person, the additional 470 mg of

midazolam will not have any further effect because it is beyond midazolam's ceiling effect of 20-30 mg/kg. *Id.* at 45-46. The studies cited above, along with the basic studies of midazolam's mechanism of action, show that sedation is the greatest pharmacological effect that was reached on any executed prisoner, and it is impossible that any benzodiazepine can achieve general anesthesia. *Id.* at 59. Therefore, the prisoners will remain sensate and feel the effects of the second and third drugs in Oklahoma's lethal injection protocol. *Id.* at 59-60.

**Midazolam does not diminish pain caused by the second and third drugs.**

15. Midazolam as used in Oklahoma's lethal injection protocol cannot diminish the pain caused by the second and third drugs. *Id.* at 64. Dr. Stevens' opinion is supported by a 2007 study published in the European Journal of Gastroenterology and Hepatology, titled "Midazolam-Pain, but one cannot remember it: a survey among Southern German endoscopists" by von Delius, et al. *Id.*; Pl. Ex. 473 ("*von Delius*"). In the *von Delius* study, the authors reported that ninety-eight percent of the questioned physicians felt that patients have pain during endoscopy with midazolam plus or minus opioids. Pl. Ex. 473 at 4. Dr. Stevens explained that this provides further evidence that midazolam does not have any analgesic effect. *Id.* at 65.

16. Dr. Stevens also relied on a 2013 article published in the Journal of Anesthesiology titled "Effect of Sedation on Pain Perception" by Frolich, et. al. *Id.* at 69; Pl. Ex. 216 ("*Frolich*"). The *Frolich* study found that midazolam did not have any analgesic properties but instead produced hyperalgesia, which means it caused the patients to have increased pain perception. *Id.* at 70. The *Frolich* study found that midazolam

increased cold, heat and electrical pain perceptions. Pl. Ex. 216 at 7, Tr. 70. This means that a person receiving midazolam is actually more sensitive to pain. *Id.* at 71.

17. Additionally, midazolam is not an analgesic drug. *Id.* at 66. An analgesic drug is selectively used only to stop pain. *Id.* Because midazolam is not a general anesthetic, and because it is not an analgesic drug and has no analgesic properties, it will not reduce the pain from the second and third drugs. *Id.* at 68-69.

**The second and third drugs in the Oklahoma Execution Protocol  
will cause extreme pain and suffering.**

18. An injection of 240 milliequivalents of potassium chloride, the third drug as called for by the lethal injection protocol, will cause extreme pain. *Id.* at 71. In studies where potassium chloride has been injected into someone that was not under general anesthesia, the pain has been described as a burning fire, veins on fire, and people screaming out in pain. *Id.* at 72.

19. An injection of 100 milligrams of vecuronium bromide, the second drug in the lethal injection protocol, will make the prisoner feel like he is being buried alive. *Id.* at 73. The prisoner will experience a suffocating feeling and air hunger. *Id.* at 73. The vecuronium bromide will paralyze the prisoner, and will make them unable to talk or signal if they are in pain. *Id.* at 72-73. The prisoner will not be able to respond to the burning sensations of the third drug, even though they will experience that pain, because they will be paralyzed by the vecuronium bromide. *Id.* at 74.

20. The lethal injection protocol will be torturous. *Id.* at 80. It begins with midazolam and some sedation. *Id.* Then the prisoner would feel paralysis from the

vecuronium bromide but would not be able to say anything about it or speak or respond. *Id.* Then the prisoner would be subject to the intense burning pain from the potassium chloride. *Id.* The suffering will not be seen, however, because it will be hidden by the vecuronium bromide. *Id.* at 81.

**There are alternative methods of execution  
that would substantially reduce the pain and suffering.**

21. Dr. Stevens has identified two alternative methods of execution that would substantially reduce the pain and suffering of the condemned prisoner: (1) an analgesic, preferably fentanyl, at a dose of 50 to 100 micrograms administered intramuscularly 30 to 60 minutes before the administration of pentobarbital; (2) and an analgesic (see above) followed by midazolam then potassium chloride. *Id.* at 75; Pl. Ex. 607 at 33-34.

22. The first alternative method would substantially reduce pain because of the following. Pentobarbital is a barbiturate. *Id.* at 76. Barbiturates work differently than benzodiazepines, and unlike benzodiazepines, barbiturates do not have a ceiling effect. *Id.* at 76-77. The reason that barbiturates do not have a ceiling effect and can produce general anesthesia and death is threefold: first, they produce a greater effect than benzodiazepines on the GABA receptor when GABA is present; second, unlike benzodiazepines, they can work directly on the GABA receptor without GABA present; and third, unlike benzodiazepines, they work on glutamate, the major excitatory neurotransmitter, and prevent glutamate from exciting the receptor. *Id.* at 76-77. Because of their mechanisms of action, barbiturates can produce general anesthesia, coma, and death very easily. *Id.* at 77. That is one reason that pentobarbital is indicated as the sole anesthetic for brief

procedures, whereas midazolam is not. *Id.* at 158-59. The addition of an analgesic drug to precede pentobarbital would prevent any possible pain from flash pulmonary edema caused by pentobarbital. *Id.* at 78. Analgesic drugs are very commonly available. *Id.* at 79. “They’re probably too available.” *Id.* In prior testimony, Dr. Stevens recommended a single-drug pentobarbital lethal injection protocol as an alternative method of execution, but after reviewing other expert opinions, he believes the addition of an analgesic preceding pentobarbital would make the execution less painful. *Id.* at 147-148.

23. The second alternative proposed by Dr. Stevens is an analgesic followed by midazolam followed by potassium chloride. *Id.* at 80. This alternative would substantially reduce pain because the protocol contains an analgesic, and at a relatively high dose level, there would be total pain blockage or at least significant pain reduction for the inmate. *Id.*

24. Dr. Stevens testified previously that a midazolam and analgesic fentanyl combination would not render someone insensate to severe pain and suffering from a paralytic. *Id.* at 155. The reason for this is that fentanyl and midazolam would not render someone under general anesthesia, only insensate to pain. *Id.* at 153. The prisoner would continue to suffer from effects such as “air hunger.” *Id.* at 151. Thus, the vecuronium bromide is removed from Oklahoma’s lethal injection protocol which would get rid of the horror of being paralyzed and suffocating and not being able to respond to the torturous effects of the vecuronium bromide. *Id.* at 80.

**E. Gail A. Van Norman, M.D.**

1. Dr. Van Norman is a Professor of Anesthesiology and Pain Medicine at the University of Washington, where she is Adjunct Professor of Bioethics. Tr. 483. She trains other anesthesiologists and has been doing so for 36 years. *Id.* at 483. In all, she has trained well over a thousand anesthesiologists. *Id.* at 483. She has provided anesthesia to patients for 35 years, and she is a specialist in cardiothoracic anesthesia. *Id.* at 485. She is certified in healthcare ethics, and served on the American Society of Anesthesiologists' Ethics Committee for 19 years, including as chair for 3 years. *Id.* at 485. She also served as chair and co-chair of hospital ethics committees at the University of Washington Medical Center and St. Joe's Medical Center in Tacoma, Washington. *Id.* at 486.

2. Dr. Van Norman has extensive experience with anesthetic drugs and benzodiazepines, and she has had approximately 750 cases in her career that involved high-dose midazolam. Tr. 486.

3. Dr. Van Norman concludes to a virtual medical certainty that the four prisoners executed using the Oklahoma three-drug protocol in late 2021 and early 2022 experienced extreme pain and suffering during the course of the execution. Tr. 487-488.

4. During the four recent executions conducted by the Oklahoma Department of Corrections ("ODOC"), ODOC did not continuously monitor the prisoner to check for signs of severe pain and suffering. Instead, the EKG/pulse oximeter strips demonstrate that monitoring occurred during discrete 10-second intervals only, despite the fact that monitors are capable of running continuously. Tr. 507-508.

5. The waveform for the pulse oximeter readings on the EKG/pulse oximeter strips used during the four recent executions do not show characteristics needed for accuracy. Tr. 513. Specifically, the waveform does not show the “dicrotic notch,” which would be shown if the monitor was reading the intensity appropriately. *Id.* at 509-510.

6. Currently, sternum rubs to determine one’s responsiveness are considered unreliable and specifically recommended against by the authorities who assess neurologic status. Tr. 527-528.

7. From her review of witness statements concerning the movements of John Grant during his execution, Dr. Van Norman concludes that his movements after the administration of midazolam, including “labored breathing and the movements raising his back off the gurney, are consistent with him feeling upper airway obstruction and beginning to feel feelings of suffocation and asphyxiation.” Tr. 499. These are not movements that an anesthesiologist would consider to be reflexes. Instead, if anesthesiologists saw such movements in the operating room, they “would assume that the patient was awake, and we would do something about it.” *Id.* at 499-500.

8. Plaintiffs’ Exhibit 37, a postmortem photograph of John Grant in the execution chamber, refutes any notion that John Grant merely regurgitated (as opposed to vomited) during his execution. Tr. 503-504. “Regurgitation” involves the passive passage of fluid up in the esophagus and is not propelled or spit out, but is merely “passively refluxed up.” *Id.* at 503. If Mr. Grant had merely regurgitated, stomach contents would, at most, be seen right next to his face, but instead Plaintiffs’ Exhibit 37 shows a propulsion of gastric contents, which is “not consistent with passive regurgitation.” *Id.* at 504. “It is a



demonstration of vomiting, which is an active process that involves a reception in the brain of the sense of nausea, impending nausea, and then expulsion of the stomach contents.” *Id.* at 504. The amount of solid material that was present further confirms that Mr. Grant vomited and did not merely regurgitate. That amount of material “requires more than passive seeping of fluid up into the mouth. It requires actually propulsion.” *Id.* at 623; *see also* Pl. Ex. 37 at 03487. Contrary to Defendants’ assertion, there is no photographic evidence that “showed that any regurgitated fluid . . . flowed there and did not fly and splatter three, four feet away.” *See* Tr. at 1275. Active vomiting, according to Dr. Van Norman, indicates that the person was conscious. *Id.* at 504.

9. When midazolam would have reached its maximum clinical effect on Mr. Grant, he was still making noises. Tr. 504-505. “Per notes on the DOC service log, the prisoner was making noises[,]” eyewitnesses “describe[d] clear signs of airway obstruction[,]” and monitor strips showed “clear motion or artifact on the monitor to indicate that he was moving.” *Id.* at 504-505.

10. Throughout almost all of the execution of John Grant, ODOC did not monitor Mr. Grant’s blood pressure. Tr. 512.

11. The EKG/pulse oximeter strips demonstrate that John Grant was moving five minutes after the injection of midazolam. The strip corresponding to 5 minutes after injection of midazolam, Pl. Ex. 805 at 18380, shows motion artifact, which indicates that Mr. Grant was moving. Tr. 515. That same strip also shows a SpO2 reading of 73, which is consistent with consciousness at that time. *Id.* at 515-516. At a reading of 73, “people can be quite awake.” *Id.* at 516.

12. At the time of the strip that has the notation “vecuronium bromide”, Pl. Ex. 805 at 18382, ODOC had not taken a blood pressure reading of John Grant during the previous 15 minutes. Tr. 517. Moreover, this strip demonstrates that Mr. Grant’s heart was still beating, and the SpO2 reading, if accurate, is still “compatible with total consciousness.” *Id.* at 518.

13. John Grant was clearly breathing up until the time of administration of vecuronium bromide, as demonstrated both by eyewitness reports and the monitor strips. Tr. 520.

14. John Grant’s movements after two members of the execution team entered to clean vomit from his face, as reported by eyewitness accounts and consistent with the monitor strips, demonstrate that Mr. Grant was “awake, moving purposefully and trying to clear his airway of vomit, probably having sensations at this point of drowning in pulmonary edema.” Tr. 521-522.

15. The straps that restrained John Grant during his execution crossed one another right at the point where a sternal rub would typically be done. Tr. 529; Pl. Ex. 37 at 186. Thus, a sternal rub done either below that point or above the straps would not be effective and would not constitute a sufficient consciousness check. *Id.* at 529-530.

16. The pleth line for SpO2 on the EKG/pulse oximeter strip that is marked 5 minutes after the start of midazolam during the execution of Bigler Stouffer, Pl. Ex. 808 at 18419, shows a SpO2 level that is consistent with movement by Mr. Stouffer. Tr. 548. This strip further suggests motion is taking place, because it shows extra beats when there aren’t actual heartbeats. *Id.* at 548.

17. The EKG/pulse oximeter strip marked as the administration of vecuronium bromide during the execution of Mr. Stouffer, Pl. Ex. 808 at 18422, likely shows motion, as the pulse waveform doesn't correspond with a beat. Tr. 550. Furthermore, the SpO2 reading of 46 on this strip, while likely inaccurate due to its being beyond the limits of accuracy of the machine and its abnormal waveform, is still "completely compatible with consciousness." *Id.* at 550. In fact, Dr. Van Norman has experienced patients who have still been talking to her when they had a blood oxygen level that low. *Id.* at 550-551.

18. Based on Mr. Stouffer's monitoring strips, he continued to attempt to breathe right up until the time the vecuronium bromide was given. Tr. 554.

19. During Donald Grant's execution, Mr. Grant was breathing until the vecuronium bromide was administered. Tr. 566. The evidence demonstrating that Mr. Grant tried to breathe up until the time he was paralyzed and the fact that midazolam cannot prevent consciousness in the face of strong surgical-style stimulation proves that he experienced severe pain and suffering. *Id.* at 567-568.

20. Dr. Van Norman witnessed the execution of Gilbert Postelle. Tr. 569.

21. Dr. Van Norman observed that for two and a half minutes after midazolam was administered, Mr. Postelle continued to wiggle his feet and hands throughout that entire time and was blinking his eyes. Tr. 573-574. Additionally, after 4 minutes, she observed Mr. Postelle take a "pretty big swallow" and begin to close his eyes, but his eyes never closed entirely. *Id.* at 574. Dr. Van Norman continued to see eye movements at that time. *Id.* at 574. Eye movements like the ones she observed indicate that one is not under general anesthesia. *Id.* at 574.

22. After four and a half minutes, Dr. Van Norman observed Mr. Postelle breathe more strenuously, with his chest collapsing in and the thyroid cartilage pulling down. Tr. 574-575. This means that Mr. Postelle was trying to breathe against an obstructed airway. *Id.* at 575. Furthermore, Dr. Van Norman observed Mr. Postelle's respiratory rate increase, which she timed with a stopwatch. Mr. Postelle was trying to take harder breaths and take them more frequently. *Id.* at 575. These attempts to breathe indicate that Mr. Postelle was experiencing asphyxia and airway obstruction, and he was responding to that by trying to breathe harder. *Id.* at 575-576. It was not simply a case of an unconscious person's body "continuing breathing attempts" as Defendants suggest. *See Id.* at 1274-1275.

23. For the consciousness check, Dr. Van Norman observed the IV team leader place his closed hand palm down with the knuckles contacting the lower chest/abdominal area of Mr. Postelle and rub with mild to moderate force for exactly 3 seconds. Tr. 576. The IV team leader also shook Mr. Postelle. *Id.* at 577. Dr. Van Norman did not hear any sounds that would be a loud verbal stimulus, nor Did Dr. Yen who was also present, despite the ODOC log saying "sternum rub, peripheral and verbal." *Id.* at 577.

24. The IV team leader did not perform a sternum rub in an appropriate manner to determine whether Mr. Postelle was responsive. The IV team leader's hand was below the median strap on Mr. Postelle's chest, below the main body of the sternum. *Id.* at 601. In fact, the straps were placed "right in the place where you would need to be to do a sternal rub." *Id.* at 611. It is certainly plausible, even for a doctor, to inadvertently push below the sternum when meaning to push on the sternum. *Id.* at 610. Moreover, the IV team leader's knuckles were positioned outward, instead of downward as they should have been, and the

3 second time period was too short for it to have been a proper sternum rub. *Id.* at 602. A proper sternum should be sustained for at least 15 to 20 seconds. *Id.* at 608.

25. The EKG/pulse oximeter strip corresponding to 5 minutes after administration of midazolam during the execution of Mr. Postelle (Def. Ex. 129 at 002, timestamp 10:06:02) shows a lot of motion artifact, which demonstrates that Mr. Postelle was moving at that time. Tr. 585-586.

26. Defendants' Exhibit 129 at 005 is a monitoring strip marked with the event "rocuronium," which is a muscle paralytic agent but not the one called for by the three-drug protocol. Tr. 587. The SpO2 reading of 53 on that strip, while below the level of accuracy of the machine, would also still be "fully compatible with consciousness." *Id.* at 587-588.

27. As the saline flush was injected into Mr. Postelle following the administration of vecuronium bromide, Dr. Van Norman observed Mr. Postelle move his hand. Tr. 594. The movement was not a reflex movement. *Id.* Rather, it was a conscious movement in response to feelings of paralysis that were coming on. *Id.* at 595. It did not correspond to any reflex movement Dr. Van Norman had seen in her experience with brain-injured patients and brain-dead donors. *Id.* at 596. Dr. Van Norman thought at the time that Mr. Postelle was trying to make a fist. *Id.* at 594. His hand then went limp slowly at the time the vecuronium paralyzed him. *Id.* Defendants' contention that Dr. Yen "confirmed" that Mr. Postelle's finger movement "likely was a reflexive response" is simply not credible. *See Id.* at 1276. Dr. Yen did not testify that Mr. Postelle's finger movement was

likely a reflexive response, and in fact Dr. Yen testified that he did not even witness that movement. *Id.* at 1108.

28. At about the same time that Mr. Postelle received vecuronium bromide and Dr. Van Norman observed Mr. Postelle clenching his hand, tearing occurred. Tr. 598-599; Pl. Ex. 817 at 002. Tearing is a sign of “extreme stress” and, in the operating room, is taken as a sign that patients “are perceiving stress and pain and that [anesthesiologists] should do something about it.” Tr. 598. As Mr. Postelle’s eyes were not closed during the execution, it could not have been tearing that “had been sitting for 15 minutes in his eyes ready to fall outside of closed lids, this was tearing that, in [Dr. Van Norman’s] opinion, occurred at that time and would be a sign of extreme stress.” *Id.* at 600.

29. In all, the monitoring strips from the recent Oklahoma executions “do not show anything incompatible with consciousness.” Tr. 617.

30. John Grant, Bigler Stouffer, Donald Grant, and Gilbert Postelle each experienced severe pain and suffering when they were subjected to the Oklahoma three-drug protocol. To a virtual medical certainty, each of them experienced sensations of asphyxiation, drowning, the onset of paralysis, and pain and suffering from the injection of potassium chloride while they were conscious. Tr. 624.

**F. Michael L. Weinberger, M.D.**

1. Dr. Weinberger has close to forty years of experience, Tr. 365; Pl. Ex. 3, and is Board Certified in Anesthesiology and in Pain Medicine, two disciplines highly relevant to evaluating whether midazolam as the sole sedative drug in the Oklahoma Protocol (“Protocol”) will prevent prisoners from experiencing the severe pain and suffering of the Protocol. *Id.* He holds faculty and senior clinical positions at Columbia University, Tr. 362; Pl. Ex. 3, and before becoming a pain medicine specialist, Dr. Weinberger worked as an anesthesiologist from 1986 to 1998 during which time he put thousands of patients under anesthesia. Tr. 363.

2. Dr. Weinberger has used benzodiazepines in both his anesthesiology and pain medicine practices. Tr. 363. Evaluating the Oklahoma three-drug Protocol, Pl. Ex. 45, Dr. Weinberger testified, to a reasonable degree of medical certainty, that it would cause prisoners noxious stimulation in the form of significant pain and suffering. Tr. 365.

3. Dr. Weinberger testified that when he worked in intensive care early in his career he observed patients experiencing pain due to potassium chloride administration. Tr. 366. In those cases, the doses were 10 milliequivalents over the course of an hour. Tr. 377. Dr. Weinberger also explained the clinical rate of administration as either 10 milliequivalents per hour in a concentration of 40 milliequivalents per liter for patients with low potassium, or up to 40 milliequivalents per hour for patients with severely low potassium. Tr. 367; Pl. Ex. 582 at 14578.

4. The amounts of potassium administered in the Oklahoma Protocol is 240 milliequivalents over a few minutes. Tr. 368; Pl. Ex. 45 at 03645-48. Dr. Weinberger explained that for prisoners administered such a massive potassium dose over such a short period of time: “One would expect that they would have severe pain. Potassium depolarizes or activates nerves and also can cause direct damage to the lining of the nerve, or the veins ....” Tr. 368.

5. Dr. Weinberger also testified that a prisoner administered the 100 milligram dose of vecuronium bromide under the Protocol, if not maintained under general anesthesia, “would have the sensation of asphyxiation or suffocation and have ... extreme anxiety and suffering.” Tr. 369. The *Thomsen* study, Pl. Ex. 77, Dr. Weinberger explained, confirmed that individuals administered a paralytic when not maintained under general anesthesia “will have severe consequences, emotional consequences, anxiety and suffering.” Tr. 371. Moreover, the suffering of prisoners subjected to the Protocol would be greater because, unlike in the study, they would not have an airway maintained and would have the additional noxious stimuli of suffocation. *Id.*

6. Dr. Weinberger is familiar with pulmonary edema clinically and explained that, with pulmonary edema, fluid builds up in the lungs and builds up in the lung airways and prevents the exchange of gasses ....” *Id.* at 373. A prisoner not maintained under general anesthesia and experiencing acute pulmonary edema “would experience sensations of severe – severe sensations of suffocation.” *Id.*

7. Dr. Weinberger explained how anesthesiologists maintain general anesthesia through vigilance including through a combination of various inhalation and intravenous



anesthetics and that it is never done with a single benzodiazepine, including midazolam. Tr. 388. Referencing *Miller's Anesthesia* textbook, Dr. Weinberger also testified that this well used reference states that “[B]enzodiazepines lack analgesic properties and must be used with other anesthetic drugs to provide sufficient analgesia.” Tr. 390; Pl. Ex. 474 at 658. In heart surgery, he explained, general anesthesia may be maintained using an opioid like fentanyl in conjunction with midazolam and a paralytic. Tr. 392.

8. Dr. Weinberger also testified as to benzodiazepine ceilings or their saturable effect and studies reporting on it. *Haefely*, a basic science study on this saturable effect, concluded, according to Dr. Weinberger, “that benzodiazepines ... don’t act directly, but they act on the GABA system and enhance GABA activity. They do that at a very low dose. But the maximum effect is seen at ten times threshold. So ‘threshold’ would be when you first see an effect, and at ten times threshold they reach a maximum effect. So it suggests that, at higher doses, you no longer have any further effect.” Tr. 394. *Haefely* shows the ceiling effect of benzodiazepines “at the cellular level, or a neuronal level.” Tr. 395.

9. Dr. Weinberger explained that benzodiazepines and barbiturates work by causing the opening of chloride tunnels or channels that polarize neurons but that they “have different activity and different binding sites on that tunnel.” Tr. 396. Further explaining the difference and the understanding for the ceiling effect of benzodiazepines, he explained that “[b]arbiturates can act alone, so they can affect the tunnel directly. Benzodiazepines, if there’s no GABA – if you removed GABA from a cell or from the body, benzodiazepines could have no effect because they don’t have direct activity on the

channel, they act through GABA. They enhance the activity of GABA.” Tr. 396. Moreover, as noted by Dr. Weinberger, *Haefely* states that while “barbiturates readily induce a reversible state of deep unconsciousness with absence of reactions to peripheral and even painful stimuli, benzodiazepines alone, on the contrary, is [sic.] virtually impossible to induce an anesthetic state in animal and man that would permit painful surgical operations to be performed.” Tr. 395. Notably, Dr. Weinberger referenced *Miller’s Anesthesia* textbook explaining that it teaches that benzodiazepines work indirectly through GABA with “their most common use as being anxiolysis and amnesia for conscious sedation.” Tr. 397.

10. Dr. Weinberger testified that anesthesiologists understand that benzodiazepines have a ceiling effect meaning “[t]hat at some increasing the dose will have no further impact in terms of its efficacy or its effect on the individual.” Tr. 399. Studies referencing this saturation or ceiling include *Majumder*, Pl. Ex. 67, Tr. 400. *Miyake* also supports a ceiling where no difference in effect on brain activity measured by EEG was reported comparing a large midazolam dose group of subjects to a small midazolam dose group of subjects. Tr. 401. Specifically, no difference or increased effect on brain activity was found, as Dr. Weinberger explained, when the dose was increased from 0.2 mg/kg to 0.3 mg/kg., supporting a ceiling with this data at or about 20 mg/kg in subjects weighing 100 kilograms. Tr. 402.

11. *Gamble*, Pl. Ex. 219, tested midazolam doses between 0.15 and 0.5 mg/kg and evaluated patients on their level of awakeness on a scale of 0 (the drug had no effect) to 4 (the patient was asleep). While “asleep” is not the low level of sedation required to

maintain anesthesia, Dr. Weinberger explained that for even this level and at .5 mg/kg (50 mg in a 100 kg person), forty percent were drowsy but not asleep and would have responded to verbal stimulation or the eyelash reflex. Tr. 404. This study supports the ceiling effect. As Dr. Weinberger explained, “we see, there’s not much difference between the 0.3 milligram per kilogram dose and the 0.5 milligrams per kilogram dose.” Tr. 405. Dr. Weinberger explained that *Miyake* was done to explore the finding of the *Hall* study in dogs that midazolam has a ceiling effect, and that *Miyake* concluded a ceiling or saturable effect exists in humans. Tr. 453.

12. *Inagaki*, Pl. Ex. 270, supports a ceiling effect of midazolam measured by its ability to reduce the amount of inhalation anesthetic needed to achieve MAC. Focusing on Figure 3 (p. 616) of *Inagaki*, Dr. Weinberger explained that “with increasing doses of midazolam, there is some reduction in the percent of halothane needed” to achieve MAC. Tr. 407. Dr. Weinberger explained *Inagaki* noted that the greatest effect on the reduction of halothane needed to achieve MAC was up to 134 ng/ml of midazolam in the blood and that “[f]urther increases in midazolam continued to reduce the MAC of halothane but to a lesser degree,” which *Inagaki* explained by the saturation of benzodiazepine receptors. Tr. 408-09.

13. Dr. Weinberger identified two strategies to protect a person who is subject to the pain and suffering of the Protocol – maintaining general anesthesia “designed to put the brain and brainstem to sleep to prevent the nociceptive information from reaching the brain ...” and the use of opioids, which “work to block the ability of the organism to transmit pain information.” Tr. 380.

14. Dr. Weinberger also testified that midazolam is not an analgesic drug and that no drug in the Protocol is an analgesic drug. Tr. 390-93. Moreover, Dr. Weinberger testified that no drug in the Protocol is a total anesthetic and that the Protocol lacks drugs used to induce and then maintain general anesthesia. Tr. 409. Dr. Weinberger testified that a strong painful stimulus of the kind inflicted by the Protocol would be felt by an individual on midazolam as a sole drug because midazolam is not an analgesic. Tr. 399.

15. Dr. Weinberger also explained that with respect to induction, while midazolam is not commonly used for induction it “can be used as a sole agent for induction of anesthesia, yes, but again, that’s prior to the application of painful stimuli. And so continuation requires other medications.” Tr. 436; Tr. 438.

16. Dr. Weinberger testified that because midazolam is not a complete anesthetic or indicated to maintain general anesthesia, “it’s imperative to use the techniques that [Emery] Brown advocates, to be sure that the individual would be protected from a painful stimulus.” Tr. 409-10. Explaining Brown’s work, in view of the nociception pain pathway, there is the “necessity to put the brainstem to sleep” to maintain general anesthesia “so the individual does not experience pain.” Tr. 378. To evaluate the level of sedation and to understand whether the brain stem is put to sleep and general anesthesia is maintained, the corneal reflex and the oculocephalic reflex are important tools in consciousness checks with midazolam based on the research of Emery Brown. *Id.* Dr. Weinberger explained that he was familiar with the consciousness checks Dr. Doe claimed to do and they did not include such tools. Tr. 379.

17. Dr. Weinberger refuted the contention that an airway obstruction necessarily meant a person was under general anesthesia in reference to the American Society of Anesthesiologists Continuum of Depth of Sedation Chart (“ASA Chart”), Def. Ex. 496, which provides that patients may lose their airway while under deep sedation. Tr. 383. Dr. Weinberger also testified concerning midazolam that “[i]t can act as a muscle relaxer or reduce muscle tone” in clinical doses. Apart from its sedative effect, this muscle relaxing effect of midazolam can explain airway obstruction during executions. Tr. 384.

18. Also referencing the ASA Chart, Def. Ex. 496, and its asterisks that some kinds of movement known as a reflex withdrawal is not considered a purposeful response – the point of which is that some such reflex movements are not inconsistent with general anesthesia – Dr. Weinberger explained that a movement under sedation when you are not being stimulated would most likely not be a reflex. Tr. 384-85. Accordingly, such movements as seen in John Grant and others while not being stimulated would not be mere reflexes and would be inconsistent with general anesthesia as characterized generally in the ASA Chart.

19. Dr. Weinberger also explained the ASA Chart’s characterization of general anesthesia as “the individual would be unarousable even to painful stimulus.” Tr. 385. This means that the degree of painful stimulus to which a person would be unarousable changes during a procedure, requiring vigilance to adjust anesthetics to maintain general anesthesia. Tr. 385-86. Applying the vigilance concept to the consciousness checks purportedly done by John Doe, Dr. Weinberger explained “my understanding is that the noxious stimuli provided was sternal rub, pinch of tissue. Those are noxious stimuli. But again the

potassium chloride at high doses is severely painful, we would expect that to be greater than that stimulus and the sensation of suffocation is also a fairly profound stimulus.” Tr. 387. Dr. Weinberger said that “the level of stimulation in the three-drug protocol would be greater than the stimulus provided by John Doe.” *Id.* Accordingly, even assuming John Doe did the consciousness checks he claims, these consciousness checks were inadequate to evaluate the maintenance of general anesthesia in the context of the noxious stimulus of the Protocol.

20. Relevant to the fact that a person subject to a paralytic may be awake and sensate even under what a trained anesthesiologist believes is general anesthesia, Dr. Weinberger explained the work *Russell* and its use of the isolated forearm technique to establish that an experimental group subject to a total inhalation anesthetic actually had awareness as high as 40%. Tr. 412-13. And while a prisoner subject to a paralytic cannot move to show they are not maintained in a general anesthetic state, tearing “can be a sign that the individual is experiencing pain and distress” while the absence of tearing does not mean there is no such pain and distress. Tr. 416.

21. Reviewing the Protocol, Dr. Weinberger explained that the mere job titles listed as the only qualification for IV Team leader is not a basis to establish the requisite experience to monitor and assess the maintenance of general anesthesia. Tr. 419. Dr. Weinberger reviewed the declaration of John Doe, Pl. Ex. 814, the actual IV Team leader, concerning the consciousness checks he claimed to have done in the four executions in 2021 and 2022, and even if done Dr. Weinberger testified “... the sternal rub is a noxious stimulus, but I would argue that the high-dose potassium chloride is a more noxious

stimulus, and it's certainly possible that suffocation or asphyxia is a more potent stimulus.” Tr. 424.

22. Dr. Weinberger concluded that the consciousness checks now purportedly done by John Doe share many of the same elements of the failed consciousness check of Clayton Lockett, Pl. Ex. 86 at 2156, as explained by the Lockett IV Team Leader, who testified “I blow in his eyes, I’ll rub on his sternum, I pinch him, I check his eye movement to see if there’s any eye movement.” Tr. 425.

**G. James S. Williams, M.D.**

1. Dr. Williams has practiced medicine continually since 1993. Tr. 324. His primary focus and specialty for the past 20 years has been emergency medicine. *Id.* at 324. He has treated several hundred gunshot wounds during the course of his career. *Id.* at 347.

2. In addition to his medical training and experience, Dr. Williams has extensive firearms experience, including hunting since childhood, competing as a competitive shooter in pistol and rifle competitions, and being certified as a firearms instructor by the National Rifle Association and several other organizations that recognize firearms expertise. Tr. 324-325. He has instructed others in basic firearms since the mid-1990s and instructed law enforcement and military personnel on the use of firearms and the use of deadly force since the early 2000s. *Id.* at 325. He has also published a book, the Tactical Anatomy Instructor Manual, that provides a teaching method to be used by firearms instructors in law enforcement and the military to enhance success in deadly force encounters. *Id.* at 325.

3. Dr. Williams concludes that execution by firing squad is “feasible and practicable and it’s efficacious” as an alternative means of execution in Oklahoma. Tr. 326.

4. When bullets from a firing squad strike the cardiovascular bundle, which is the heart and the great vessels and accompanying structures that surround the heart, Tr. 341, there will be two immediate effects. First, the tissues of the heart and vessels, including muscular, neural and other conductive elements, will be physically destroyed. *Id.*



at 326. Second, the impact and trauma to the pacemaking and pace-conducting structures of the heart will induce a lethal arrhythmia. *Id.* at 326-327. The lethal arrhythmia would then immediately stop circulation and the individual's blood pressure will drop to zero. *Id.* at 327. This phenomenon is aptly demonstrated by Plaintiffs' Exhibit 88, which shows an electrocardiogram tracing of a man executed by firing squad, which was published in the Chicago Tribune on November 1, 1938. In that tracing, a normal heart rhythm is seen on the left prior to the firing squad bullets impacting the prisoner. Tr. 332. Then, when the firing squad bullets strike the heart, the electrocardiogram displays a typical pattern of a lethal arrhythmia. *Id.* at 332. Thus, from the moment of impact of the bullets, the heart ceased organized beating and from that point there was "almost certainly complete cessation of forward blood movement and a systemic loss of blood pressure going from whatever the physiological norm was prior to the gunshot wound, it is reduced to zero at that point." *Id.* at 333. The individual executed by that firing squad would have lost consciousness somewhere between one and two seconds later. *Id.* at 333.

5. The time it takes for the blood pressure of an individual shot in the cardiovascular bundle to drop to zero is very rapid. Tr. 327. This immediate effect has been confirmed by interviews Dr. Williams has conducted with multiple people who have been on the scene when individuals were shot in the heart, as well as U.S. military field medics who described to him an almost immediate cessation of purposeful movement by individuals who had experienced gunshot wounds to the cardiovascular bundle. *Id.* at 327-328.

6. After one's blood pressure drops to zero, consciousness is lost very rapidly. Tr. 329. When one experiences a lethal arrhythmia, such as ventricular fibrillation, loss of consciousness follows loss of blood pressure within one to two seconds. *Id.* at 330.

7. The impact of firing squad bullets on a prisoner's cardiovascular bundle will not cause the prisoner pain and suffering in the short time before the prisoner loses consciousness. The energy of a bullet striking the body creates an energy wave that radiates outward, resulting in a temporary cavity, which can be 20 to 30 times the diameter of the bullet. *Id.* at 337. The temporary cavity causes the tissue to stretch and become disrupted, resulting in the veins, arteries, and nerves being "stretched to the point of being no longer capable of performing their physiological function." *Id.* at 337-338. Thus, the nerves that are in the vicinity of the bullet strike are rendered insensate, resulting in a numbing or tingling sensation similar to one being hit in the funny bone. *Id.* at 338. The stretch and damage to the neural tissues makes them incapable of transmitting pain sensation, so "what comes back to the brain is kind of a static, which we perceive as numbness and tingling. It's a disorganized message from the neural structures that is not perceived as pain." *Id.* at 344.

8. In Dr. Williams' experience, individuals who have sustained gunshot wounds to the chest "do not complain of pain" and many of them "do not request narcotic analgesia unless it's offered to them." Tr. 340.

9. Dr. Williams experienced the numbness associated with a gunshot wound to the chest personally, when he was shot at 18 years of age. Tr. 338-339. He experienced feeling "a very unpleasant, but not painful, numbness and tingling from [his] right shoulder,

radiating up into the right side of [his] face, [his] entire neck on the right side, the right side of [his] chest, down to [his] waist. [His] entire right arm was numb. And the numbness radiated around to the back.” *Id.* at 339.

10. Execution by firing squad is feasible. Protocols for execution by firing squad from the State of Utah and the U.S. military would both be adequate to accomplish an effective execution. Tr. 350.

## **II. CRITIQUES OF DEFENDANTS' EXPERT WITNESSES**

The following is a critique of the testimony, opinions and conclusions of each expert called by the Defendants:

### **A. Joseph F. Antognini, M.D.**

1. Dr. Antognini's opinion that midazolam would be effective to maintain general anesthesia as a sole drug is not based on any clinical experience because he admitted that his use of midazolam has been limited to as a pre-anesthetic and a sedative.<sup>3</sup> Tr. 628. The basis for these opinions is on a misreading of studies that in fact prove that midazolam cannot maintain general anesthesia, and cannot render a prisoner insensate to the second and third drugs of Oklahoma's execution protocol.

**Midazolam can be used for the induction of general anesthesia, but induction is a depth of anesthesia that is not as deep as the maintenance of general anesthesia.**

2. Dr. Antognini testified that midazolam could induce anesthesia, and that at the induction stage, a patient is in the same depth of sedation as the maintenance of general anesthesia phase. Tr. 648-49. To support his opinion, Dr. Antognini relied on multiple studies and the FDA label. *Id.* Those studies and the FDA label explain that at the induction phase, a person is not as deeply anesthetized as he is during the maintenance phase.

3. The FDA label does not say midazolam can be used as a solo drug for maintenance of general anesthesia. Tr. 772; Def. Ex. 44. Instead, it explains that

---

<sup>3</sup> Dr. Antognini clarified that a preanesthetic is used during the "pre-induction" phase of anesthesia, which "could be anywhere between 5, 10, 15 minutes before we actually induce the patient." Tr. 628.

midazolam can be used “intravenously for the induction of general anesthesia *before the administration of other anesthetic agents.*” Tr. 771-772; Def. Ex. 44 at 8. According to the five studies relied on by Dr. Antognini to show that midazolam can be used for induction of anesthesia, the depth of sedation required to achieve “induction of anesthesia” is nowhere close to the depth of sedation required for maintenance of general anesthesia, which is defined by the American Society of Anesthesiologists as “unarousable even with painful stimulus.” *See e.g.* Tr. 759-68; Pl. Ex. 496.

4. In the first study, *Baker*, “induction of anesthesia” is synonymous with sleep. Tr. 761; Pl. Ex. 132 at 2. Patients in the *Baker* study, while under induction of anesthesia, could be aroused by painful or loud stimuli. *Id.* In the second study, *Reves* (1985), induction of anesthesia was defined as accomplished when there was unresponsiveness to a command and loss of a reflex to brushing of the eyelids. Tr. 763-64; Pl. Ex. 396, at 8, table 2. The authors noted that “[a]s an induction drug, midazolam produces sleep and amnesia, but it does not have a great analgesic effect.” *Id.* The authors explained that induction was not the same as maintenance, stating: “midazolam cannot be used alone, however, to maintain adequate anesthesia.” Tr. 764-65; Pl. Ex. 396 at 9.

5. In the third study, *Blackmon*, induction of anesthesia was defined as a loss of response to verbal commands, loss of eyelid reflex, and loss of voluntary movement in response to a facemask. Tr. 766; Def. Ex. 35 at 2. No painful stimuli was applied. Tr. 766. To maintain general anesthesia in the *Blackmon* study, the authors administered to each patient nitrous oxide, and endoflurane, which is a complete anesthetic. *Id.* at 766. In the fourth study, *Reves* (1978), induction of anesthesia was defined as complete loss of

eyelid reflex and failure to respond to oral commands. Tr. 767; Def. Ex. 55 at 1. No painful stimuli was applied. *Id.* In the fifth study, *Kuizenga*, the authors defined induction of anesthesia as synonymous with non-responsiveness to simple commands from a pre-recorded tape given by headphones every thirty seconds. Tr. 768; Pl. Ex. 303 at 2. The first time the patient did not respond to a verbal command from the headphones was registered as loss of responsiveness, and thus the patient was considered to be in the induction of anesthesia phase. *Id.* No painful stimuli was applied. *Id.* at 768.

6. Despite equating induction of anesthesia to maintenance of anesthesia, when asked by the Court whether he would use midazolam alone for a very short procedure, Dr. Antognini was equivocal: “If it was short . . . where it was going to literally take 30 seconds, *then I might say ‘go ahead.’*” *Id.* at 648-49 (emphasis added).

**Midazolam cannot achieve and maintain general anesthesia.**

7. The BIS monitor is a monitor for assessing anesthetic depth. Tr. 755. Dr. Antognini explained that doctors target a range of 40 to 60 on the BIS monitor to consider a patient in a plane of general anesthesia. Tr. 756-57. Dr. Antognini testified that if a patient had a BIS score of 65 or 70, there is an increasing probability of awareness and memory. *Id.* In *Miyake*, a study that forms the basis of Dr. Antognini’s opinions, the authors found that “the maximum effect of midazolam on the BIS is 70.” Tr. 836, Pl. Ex. 344 at 5. In other words, *Miyake* shows that a person sedated with midazolam at any dose cannot achieve BIS scores that doctors target for the range of general anesthesia.

8. Dr. Antognini relied on *Eisenreid*, Def. Ex. 38, and *Schuttler*, Def. Ex. 50, to opine that with the benzodiazepine Remimaolam, Narcotrend Index scores, which are

similar to BIS scores, can get to 40-60, “which is the range that is used for surgery.” Tr. 724; 756-57. But Dr. Antognini admitted that the authors found that “Narcotrend index showed a relatively weak and discordant relationship to the [patients’ actual anesthetic depth] and therefore it might be less suitable for monitoring the sedative effect if remimazolam is administered alone.” Tr. 824-825 (quoting Def. Ex. 38 at 13). This finding was consistent with the *Glass* study cited in Dr. Antognini’s report, Pl. Ex. 225, which found that subjects who received midazolam and whose BIS levels fell as low as 50 remained responsive to mild prodding. Tr. 838. Dr. Antognini admitted that the *Eisenried* and *Schuttler* studies did not prove that midazolam could produce general anesthesia. *Id.* at 822-26 (*Eisneried* and *Schuttler*).

9. Dr. Antognini also relied on the *Crawford* study, Pl. Ex. 181, for his opinion that midazolam is suitable for induction and maintenance of anesthesia for a Caesarian section. Tr. 715. Dr. Antognini admitted that he would not use midazolam for the induction of anesthesia in a C-section “in this day and age.” *Id.* In *Crawford*, all patients received atropine, a drug that scatters perception, before they received midazolam. Tr. 827-828, Pl. Ex. 181 at 2. Before the C-section, the patients were intubated. Tr. 828. Before intubation, each patient received a total of four drugs. *Id.* At the time of intubation, the patients could not talk or move because one of the four drugs was a paralytic. *Id.* After the C-section and umbilical cord division, each patient was given an opioid analgesic.<sup>4</sup> *Id.* at 829. If the hospital believed the patient was responding to the surgery, they were given

---

<sup>4</sup> Opioids are analgesic drugs that relieve pain. Tr. 639.

supplementary doses of the opioid analgesic. *Id.* at 829-830. Each patient who received midazolam as their induction drug for the C-section was given supplementary doses of the opioid, and on average, patients who received midazolam were given double the initial dose of the opioid. *Id.* at 832-33. Dr. Antognini admitted that this study does not prove that midazolam can be used for general anesthesia as a solo drug. *Id.* at 834.

10. Dr. Antognini later explained that he relied on only two studies, *White*, Def. Ex. 61, and *Michouloudis*, Def. Ex. 52, to support his opinion that midazolam will render the prisoner insensate to the second and third drugs in Oklahoma's lethal injection protocol. Tr. 846-847. Neither of those studies, however, support that conclusion.

11. In *White*, the authors concluded that midazolam "may be the benzodiazepine of choice as an adjunct to ketamine." Tr. 849; Def. Ex. 61 at 4. Ketamine is a drug that is used for the maintenance of anesthesia. *Id.* at 849. The term "adjunct" as used in the *White* study means a thing added or as supplemental. *Id.* The *White* authors did not conclude that midazolam could be used alone for surgical procedures, but instead that midazolam may be added with ketamine for intubation procedures. *Id.*

12. Like *White*, the *Michouloudis* authors did not suggest that midazolam should be used for surgical procedures as a solo drug. *Id.* at 850. Dr. Antognini believed that in *Michouloudis*, patients were under general anesthesia because the authors stated that the patients were anesthetized. The authors did not state that. Instead, the patients were paralyzed, *Id.*, and the authors' conclusion was not that midazolam can achieve general anesthesia but that "midazolam . . . perhaps when combined with an appropriate dose of an opioid" may be a good choice for intubation. *Id.* at 853; Def. Ex. 52 at 4.



13. These findings are consistent with Miller’s textbook on anesthesia, which is one of the main textbooks for anesthesiology. Tr. 799, Def. Ex. 60. Miller’s textbook classifies benzodiazepines, like midazolam, as having “hypnotic, sedative, anxiolytic, amnesic, anticonvulsant, and centrally produced muscle-relaxing properties” but not “anesthetic properties.” Tr. 801, Def. Ex. 60 at 19. *Miller’s Anesthesia* further states, similar to *White* and *Michouloudis*, that “benzodiazepines lack analgesic properties and must be used *with other anesthetic drugs* to provide sufficient analgesia.” *Id.* (emphasis added). If benzodiazepines produced general anesthesia as solo drugs, they would not need other anesthetic drugs to provide sufficient analgesia. Midazolam’s FDA label notably limits midazolam’s indicated use not only to induction but specifically, “... induction of general anesthesia, *before administration of other anesthetic agents.*” Pl. Ex. 44 at 8 (emphasis added). Even the label indicates additional anesthetic agents are required after induction with midazolam.

**Dr. Antognini testified that midazolam can achieve “unconsciousness”  
but admitted that “unconsciousness” means much less sedation  
than maintaining general anesthesia.**

14. Dr. Antognini testified that although the articles that he relies on describe midazolam’s ceiling effect, Tr. 790-91; Pl. Ex. 270 at 4, he is not concerned that midazolam might reach a ceiling effect before “the desired endpoint of unconsciousness.” Tr. 670-71. He further testified that prisoners will not feel pain from the second and third drugs because “midazolam produces unconsciousness.” *Id.* at 717-18. Both of these conclusions are belied by the sources he uses to support them.

15. Dr. Antognini admits that he uses the term “unconsciousness” to refer to levels of anesthetic depth higher than levels required to “induce anesthesia” or to “maintain anesthesia.” Tr. 757-758. The three studies on which Dr. Antognini relies to establish that midazolam can produce unconsciousness all define unconsciousness at a level of sedation insufficient to prevent the pain and suffering caused by the second and third drugs. Pl. Ex. 225 (Glass), Pl. Ex. 270 (Iganaki), Pl. Ex. 126 (Antonik).

16. In the first study, *Glass*, “consciousness” was defined as whether a subject responded to an oral command. Tr. 777; Pl. Ex. 225. If a subject responded to mild prodding, but not a verbal command, they would be deemed “unconscious.” *Id.* at 784, 810-811. Every subject in *Glass* who received midazolam, including those who were deemed “unconscious,” responded to a trapezius squeeze. *Id.* at 779.

17. In the second study, *Iganaki*, the authors use the term “unconsciousness” to mean a subject would not respond to verbal stimuli, but they would respond to tactile stimuli. *Id.* at 787-788. Dr. Antognini explained that when he uses the word “unconsciousness,” he means that subjects would still respond to noxious stimuli. *Id.* at 788.

18. In the third study, *Antonik*, the authors use the term “unconsciousness” to mean that a subject does not respond to mild prodding or shaking, but could still respond to a trapezius squeeze. Tr. 812-813; Pl. Ex. 126 at 6. If a subject responded to a trapezius squeeze in the *Antonik* study, they could nevertheless be deemed “unconscious.” *Id.* at 814. Dr. Antognini admitted that less anesthetic is needed for a non-response to a trapezius

squeeze than for surgery, and that a bolus dose of potassium chloride is more painful than a trapezius squeeze. *Id.* at 781, 817.

19. Dr. Antognini further admitted that when he states that “midazolam can result in unconsciousness,” he simply means that a patient would not respond to someone calling their name loudly, but they would respond to mild prodding or shaking. Tr. 794-95.

**Dr. Antognini testified that studies show midazolam can cause a reduction in feeling of pain, but the studies he relies on ask subjects to self-report their pain after surgery even though midazolam causes those patients to not remember the surgery.**

20. Dr. Antognini testified that the *Manning* study, Def. Ex. 50, showed that “midazolam clearly had an effect on [patient’s] pain from” the insertion of a nasogastric tube. Tr. 718, 720. In *Manning*, researchers assessed the subjects’ pain by asking them to rate their pain after the procedure was over. Def. Ex. 50 at 2. Dr. Antognini admitted that midazolam is an amnestic and therefore causes amnesia. Tr. 798-99. That means that patients who receive midazolam will have a lack of recall. *Id.* at 799. Dr. Antognini admitted that in studies like *Manning*, which use midazolam and then ask patients to assess their discomfort after the procedure, “[he does not] know their – how much recall they would have had.” *Id.* at 841. Dr. Antognini further admitted that the study does not show that midazolam can achieve general anesthesia. *Id.* at 845.

21. Similar to the *Manning* study, the C-section patients in the *Crawford* study, Pl. Ex. 181, were also asked to assess their pain of the procedure after the procedure. Tr. 833; Pl. Ex. 181 at 2. Dr. Antognini admitted that after receiving midazolam for the C-

section procedure, the patients would not be able to remember the procedure after the fact. Tr. 834.

**The second and third drugs are torturous to an awake person.**

22. Dr. Antognini testified that the injection of vecuronium bromide to an awake person would cause suffering. Tr. 855. Dr. Antognini further testified that the injection of potassium chloride to an awake person would cause burning pain. *Id.* at 855. If the prisoner is “unconscious” from the midazolam as Dr. Antognini defines it, once the prisoner is injected with potassium chloride, he will awaken and make a purposeful response. Tr. 759-760; Pl. Ex. 496 (Chart by the American Society of Anesthesiologists explaining that at a level of sedation above general anesthesia – deep sedation or analgesia – repeated or painful stimulation will cause a purposeful response). Once the vecuronium bromide is injected, however, the prisoner will not be able to show any signs of distress so there is no way to determine their consciousness or pain by simply watching them. *Id.* at 856.

**Dr. Antognini’s other opinions are unreliable.**

23. Dr. Antognini testified that the sternal rub he witnessed during Donald Grant’s execution was sufficient to assess consciousness. Tr. 749. Dr. Antognini testified that a sternal rub “doesn’t require much in terms of training[,]” is “a very simple process” and that “[he has] done it himself.” *Id.* at 683-84. Despite testifying that he has done it himself, he also told the Court that “I cannot remember a time that I used a sternal rub, for example, to see if somebody was unconscious after the induction of general anesthesia.” *Id.* at 673. His opinion that a sternal rub is sufficient to assess consciousness thus is not

supported by his experience. Moreover, he admits that a sternal rub is less noxious than the burning pain from the potassium chloride. *Id.* at 856.

24. Dr. Antognini's opinions related to the firing squad are also unreliable as he is not an expert in pain medicine and the only sources that he relied upon for his opinions related to firing squad are two YouTube videos. *Id.* at 855-56.

**B. Daniel E. Buffington, PharmD**

1. Dr. Buffington is not an anesthesiologist. Tr. 952. Nor is he a physician of any kind. *Id.* at 961.

2. Dr. Buffington is a pharmacist who holds a PharmD degree. Tr. 950; Def. Ex. 20 at 1. He does not hold either a Master's or Ph.D in pharmacology. Tr. 950.

3. Despite the fact that he does not have a degree in the field of pharmacology, Dr. Buffington nevertheless holds himself out as a clinical pharmacologist, Tr. 951, and claims to have expertise in “[c]linical pharmacology and toxicology.” *Id.* at 865. He asserts that pharmacy and clinical pharmacology are “synonymous” or “interchangeable.” *Id.* at 953-954. But, as Dr. Stevens explained, pharmacologists and pharmacists are not equivalent to one another. They study in different programs, *Id.* at 10, and, while a pharmacist obtains a PharmD degree, a pharmacologist obtains “a Ph.D in pharmacology [which is] a specific degree that confers the status or title of pharmacologist.” *Id.* at 9. Pharmacology is a broad discipline that includes not only pharmacy but also medicinal chemistry and toxicology. *Id.* at 10.

4. Dr. Buffington was previously disqualified as an expert witness in a lethal injection case. Tr. 955. His testimony has further been excluded in other cases as well. *Id.* at 955-956. Dr. Buffington confirmed that a magistrate judge in another case found his testimony to be “lacking intellectual rigor or any indicia of reliability.” *Id.* at 956-957.

5. Dr. Buffington has not written any articles on midazolam, Tr. 960, and could not recall if he had ever even written a prescription for midazolam. *Id.* at 960-961.

6. Dr. Buffington considers himself to be competent in pharmaceutical compounding, which is a discipline included in his pharmacy training. Tr. 942. He has compounded sterile injectable products at “numerous job functions at different facilities.” *Id.* at 942. He admitted that pentobarbital “absolutely can be compounded” and that he could personally compound it if he had access to appropriate facilities. *Id.* at 943. He further admitted that he does have access to the facilities that would be needed to do so. *Id.* at 944. Nonetheless, for unknown reasons, the State of Oklahoma has never asked Dr. Buffington to either compound pentobarbital or identify a contract manufacturer to manufacture pentobarbital. *Id.* at 947-948.

7. Dr. Buffington testified that he did not think general anesthesia was achieved in a clinical setting where midazolam was administered at a dosage between 80 and 100 milligrams, the highest he has seen used. Tr. 917-918. His testimony that doses “as low as 20 milligrams and 30 milligrams” are sufficient to “provide the level and depth of sedation for surgical procedures” and that higher doses would be expected to produce a greater effect, *Id.* at 918-919, is simply not credible in light of this admission that even 80 to 100 milligrams did not result in general anesthesia in a clinical setting.

8. Dr. Buffington testified that general anesthesia would last approximately 60 to 90 minutes from midazolam alone. Tr. 911. But even Dr. Antognini, who is an anesthesiologist and an expert for Defendants, testified that he might only allow a surgeon to make an incision in the abdomen of a patient who was administered midazolam alone if it was for a procedure that “was going to literally take 30 seconds.” *Id.* at 648.

9. Dr. Buffington challenged the reliability of blood concentration values seen on autopsy, contending that “postmortem redistribution . . . reduces the reliability of making interpretations or opinions” about the blood concentration levels. Tr. 874. But he acknowledged that drug levels reported from autopsies have been used in the scientific community to determine “fatal levels” or “lethal levels” of drugs, which directly undercuts his testimony concerning postmortem redistribution. *Id.* at 886.

10. Dr. Buffington testified that midazolam produces anterograde amnesia, which he described to mean that, if an individual is given midazolam, “the individual will not recall.” Tr. 899. According to Dr. Buffington, this means that an individual given midazolam “can’t perceive the pain,” *Id.*, because he or she will be unable “to interpret and make memories of the event in the moment of the event[.]” *Id.* at 898. If that was true, it would mean that midazolam could be used alone to prevent pain for any surgery. But, of course, it is not. It is undisputed that midazolam is an amnestic drug that is usually used for minimal, moderate, or even deep sedation. *Id.* at 811. At those levels, midazolam indeed causes individuals to lose memory. *Id.* at 798 (Dr. Antognini). But that lack of memory is not equivalent to a lack of perception of pain in real time. Plaintiffs’ Exhibit 496, the American Society of Anesthesiologists’ Continuum of Depth of Sedation, demonstrates that, even at a level of deep sedation, an individual has “[p]urposeful response following repeated or painful stimulation,” while at moderate sedation, an individual has “purposeful response to verbal or tactile stimulation,” and, at minimal sedation, has “normal response to verbal stimulation.” Pl. Ex. 496 at 1. A “[r]eflex withdrawal from a painful stimulus is NOT considered a purposeful response.” *Id.* at 2. Therefore, whether individuals given



midazolam are in a state of minimal, moderate, or deep sedation, they will continue to have purposeful (i.e. non-reflexive) movements in response to stimulation. Accordingly, Dr. Buffington's assertion that individuals administered midazolam "can't perceive the pain," Tr. 899, would necessarily mean that individuals who demonstrate purposeful movement in response to stimulation are unable to feel or perceive any pain from that very stimulation. That assertion is unsupported and lacks credibility. Dr. Buffington's opinions should not be credited.

**C. Ervin Yen, M.D.**

1. The highest dose range of midazolam Dr. Yen recalls using is “anywhere from 1 milligram to 20 milligrams.” Tr. 1081. He has no experience with high dose midazolam. Dr. Yen admitted on cross examination that he cited and was aware of no study to support that midazolam, at any dose, could maintain general anesthesia. Tr. 1181, 1185. Dr. Yen also testified about his use of midazolam in heart surgery but in all those cases he also used substantial doses of opioids, including fentanyl and sufentanil. Tr. 1214.

2. *Miller’s Anesthesia* is the leading text in the field and it plainly teaches that benzodiazepines lack analgesic properties and must be used with other anesthetic drugs to provide sufficient analgesia. Pl. Ex. 474 at 658. Dr. Yen admits Miller’s is an authority in the field “utilized by many training programs, including mine.” Tr. 1176 Moreover, Dr. Yen also agrees with Miller’s statement that “benzodiazepines are used primarily for anxiolysis and amnesia or for conscious sedation.” *Id.*

3. Dr. Yen makes the extraordinary claim that midazolam, as the sole sedative in the Protocol “is adequate to carry out an execution in a manner that minimizes, as much as possible, the pain and suffering that an inmate might go through.” Tr. 1076-76. This opinion notably acknowledges the existence of pain, and the minimization of it “as much as possible” fails to address Plaintiffs’ showing on the first prong of *Glossip* that the Protocol results in severe pain and suffering. Notably, Dr. Yen acknowledged on cross examination that the label for midazolam does not authorize its use as a sole anesthetic as purportedly used in this Protocol, as he admitted that the only label indication relating to inducing anesthesia does not indicate it may be used for induction alone but instead

“induction of anesthesia followed by the administration of other anesthetics.” Tr. 1178. When asked if he has any references to support his bald assertion, he simply stated he is unaware of any 500 mg dosing studies to prove his point. Tr. 1204

4. Dr. Yen also opines that if midazolam does not maintain general anesthesia, then he “absolutely” believes that the lesser sedation level, as defined by the ASA and known as deep sedation, “would be sufficient to eliminate the pain from the procedure.” Tr. 1157. Dr. Yen offers no authority or scientific basis for offering such an absolute opinion that under the Protocol, which lacks an analgesic drug, prisoners would not experience the Protocol’s severe pain and suffering.

5. Dr. Yen admits that that the ASA Chart defines “deep sedation” in part as a purposeful response to repeated or painful stimulation. Tr. 1196. When pressed on his incongruous claim that the anesthetic state of deep sedation, which is characterized by purposeful response to painful stimulus, is a state where pain is not felt, Dr. Yen had no answer. Instead, he made the irrelevant claim that he has given anesthesia to at least 25,000 patients, and that less than five of them had recall of their surgery to his knowledge. Tr. 1197. The lack of recall later of pain does not equate with the pain not having been experienced. Indeed, Dr. Yen admitted on cross examination that when a person who did not recall a painful procedure due to amnesia, it does not mean it was not painful at the time.<sup>5</sup> Tr. 1175. Dr. Yen’s lack of a relevant response to explain his claim that a prisoner only under deep sedation would not experience pain undermines his credibility.

---

<sup>5</sup> This admission squarely conflicts with the baseless opinion of the pharmacist-trained Dr. Buffington, Tr. 898-900, a further reason to not credit Dr. Buffington.

6. Dr. Yen admitted that on the clinical administration of potassium chloride, he has observed a range of reactions from none to “burning inside of the arm.” Tr. 1186. Dr. Yen, however, admitted that “a lot” of his experience with the use of potassium chloride is injecting it into patients who are already believed to be maintained under general anesthesia and thus one would not expect a reaction. Tr. 1189-90. Dr. Yen also admitted that none of these cases in his experience of using midazolam involved administering potassium chloride to a patient maintained under general anesthesia where general anesthesia was maintained solely with midazolam. Tr. 1190.

7. Dr. Yen also advanced the argument that the pain of administration of potassium chloride would be less if given into a larger vein such as through a central line, but when questioned, he admitted this was not done in the executions he observed. Tr. 1186. The Protocol provides for the use of a central line only as an alternative when a peripheral line cannot be established. Pl. Ex. 45 at 03631.

8. Dr. Yen claimed that he has used midazolam “to induce general anesthesia” and did so “probably more than ten years” ago. Tr. 1083. Dr. Yen admitted that this purported use of midazolam for “induction” has been exceedingly rare, representing 5 or 10 cases in the 25,000 or more cases he has handled in his career. Tr. 1199. And these 5 to 10 cases involved individuals who were hemodynamically in trouble so that the relatively safe drug midazolam was all he could safely administer. Tr. 1199-1200. There is no claim that these hemodynamically in trouble patients did not feel severe pain and suffering given their injuries notwithstanding the use of midazolam. Moreover, in some of these 5 to 10 cases, the patients already may have been unconscious. Tr. 1200. And in these

cases an inhalation anesthetic like halothane or isoflurane and/or opioids like fentanyl, or sufentanil or morphine would be administered within a minute or a matter of minutes of the administration of midazolam. Tr. 1200. As the midazolam label requires, the use of midazolam for induction was followed even in these rare emergent procedures with the administration of other anesthetic drugs. *Id.* And none of these cases involved the use of midazolam on its own to induce general anesthesia without following midazolam with other anesthetics; and none involved maintaining general anesthesia with midazolam alone. Tr. 1200-01. Moreover, Dr. Yen uses terms like “induction” and “unconscious” to include levels of sleep or light sedation that do not reach general anesthesia or deep sedation and this is one such example, as he claims to have “induced” using “an initial dose anywhere from 5 to 10 milligrams” of midazolam followed by other anesthetics, which amount of midazolam is far lower than dosages provided in the FDA-approved label (.3 to .35 mg/kg to .6 mg/kg, that is 30 to 60 mg in 100 kg patient). Tr. 1084; Def Ex. 44 at 2. Dr. Yen has no experience inducing a level of general anesthesia with midazolam alone.

9. Dr. Yen admitted that potassium chloride as administered in solution is comprised of potassium ions and chloride ions and that it causes nerve fibers to fire, causing nerve pain. Tr. 1190. Dr. Yen also testified that the high osmolality of concentrated potassium chloride (that is, the concentration of dissolved solutes, here the ions) in solution can damage cells, causing them to shrink. Tr. 1190-91. He admitted that this mechanism acts on the prisoner’s blood vessels and internal tissue just as putting salt on a slug causes it to appear to melt. Tr. 1191-92.

10. Dr. Yen admitted that the amount of potassium chloride used in the Protocol is much greater than that with which he has experience clinically – in terms of the amount of potassium chloride as measured in milliequivalents, the concentration of those amounts, and the rate of their administration – thus exposing the prisoner’s blood vessels to orders of magnitude greater amounts of dissolved potassium and chloride ions than has been the case with Dr. Yen’s clinical experience. Dr. Yen also agreed that “the more concentrated the KCl [potassium chloride], the more chance of discomfort. And the faster you give it, the more chance of discomfort.” Tr. 1189. Dr. Yen admitted that the total amount of potassium chloride administered in the Protocol is twelve times greater than the amounts he has experience with clinically. Tr. 1189. He also admitted that the concentration of potassium chloride used in the Protocol is ten times greater than the concentration he has experience with clinically. Tr. 1188. Dr. Yen also admitted that these massive amounts of highly concentrated potassium chloride – twelve times the ions in a solution ten times more concentrated than used by him clinically – is then pushed over a period of ranging from 30 seconds to about a minute, Tr. 1189, as compared to the extended time it would take clinically to administer the much lower amounts by IV drip. Tr. 1188. The potassium chloride label, for example, indicates IV administration over a period of an hour. Pl. Ex. 582 at 3. The Protocol causes severe nerve pain of a burning nature.

11. Dr. Yen admitted that general anesthesia is understood to be measured at BIS levels between 40 to 60. Tr. 1100. Nonetheless, he has never achieved a BIS reading of 70 or lower using midazolam as the sole drug. Tr. 1243. And one recent instance of a patient with a BIS of 68 about which Dr. Yen testified, admittedly involved the use of an

opioid with the midazolam, and the BIS level with midazolam and the opioid was as high as 80. Tr. 1102, 1243-44.

12. Dr. Yen admits that the ASA Chart, Pl. Ex. 496, confirms that the need for airway intervention, where there is an obstruction, may exist either under deep sedation or general anesthesia. Tr. 1193. Thus, the observation of any obstruction cannot be argued to be evidence of general anesthesia or its maintenance.

13. Dr. Yen testified that the 100 mg vecuronium bromide dose will stop breathing “very quickly,” Tr. 1196, but it does not stop the heart beating. Tr. 1194. This will compound the asphyxiation resulting from airway obstructions due to midazolam’s effect as a muscle relaxant and as evidenced by the breathing pattern Dr. Yen describes as rocking the boat. Tr. 1110

14. Dr. Yen was 15 feet away from John Grant and did not observe any sternal rub and he saw only movement of the IV Team Leader’s hood which may have been due to breathing or talking. Tr. 1137, 1239-40. At a similar distance from Bigler Stouffer, Dr. Yen saw the IV Team leader put flat hands on Mr. Stouffer’s chest to shake him. Tr. 1240-41. He did not see a separate sternal rub and admits in the declaration prepared shortly after the execution that he did not report seeing the IV Team Leader put his hands on the sternum. Tr. 1241. For Mr. Postelle’s execution, Dr. Yen saw the IV Team leader place hands on Mr. Postelle’s chest and shake him and then reach down on his right side but he could not see what if anything was done. Tr. 1242. Dr. Yen admitted that the EKG strips produced for the four executions in 2021-22 represented only 10 to 12 second periods and that they do not represent a continuous complete record of the execution. Tr. 1220.

15. Dr. Yen argued that John Grant only regurgitated and did not vomit, notwithstanding the testimony of fact witnesses and experts reviewing photographs of the vomitus. His testimony revealed the reason for his argument as he acknowledged that vomiting “is a very active process that involves a bunch of muscles” and “[n]ow – so we’re awake when we vomit, were conscious when we vomit.” Tr. 1136. A nonsensical statement about counsel drinking too much Boone’s Farm wine and vomiting, followed by the question whether the counsel was conscious if they lacked memory of doing so evidences once more Dr. Yen’s broad use of “unconsciousness” and confusing it with amnesia. *Id.*

16. Dr. Yen admitted that he believes, as Dr. Weinberger testified, that a consciousness check utilizing the oculocephalic reflex and the corneal reflex would tend to check whether the brain stem is active because they are reflexes that are associated with the brainstem. Tr. 1170. Dr. Yen characterized a sternal rub as “relatively painful”, Tr. 1196, but not as painful as starting an incision. Tr. 1196-97. Dr. Yen also admits that a tear of a patient under sedation can mean the patient is suffering pain. Tr. 1243.

17. Dr. Yen has admitted that midazolam is more potent than diazepam by a factor of about 1 and ½ to 2 and ½ times, which potency conversion factor allows the comparison of blood levels between persons under the influence of diazepam and midazolam. Tr. 1244. Applying this potency conversion factor, an individual that had 4,792 nanograms per milliliter of diazepam in their blood and was drowsy but responsive to verbal stimuli as in the *Divoll* reference, Pl Ex. 56 at 381-81 (for patient 7), would be



equivalent to approximately 1,917 nanograms per milliliter if you use 1 and  $\frac{1}{2}$  as the factor and 3,315 nanograms per milliliter if you use the 2 and  $\frac{1}{2}$  factor. Tr. 1245.<sup>6</sup>

18. Dr. Yen admitted that if you are shot with five bullets in and around the heart, “you’re going to destroy the ability of the heart to pump, so blood flow to the brain will stop virtually instantaneously and the brain will stop functioning in seconds.” Tr. 1243. Dr. Yen said it may take five to ten seconds and maybe an entire minute, but then he admitted he has seen patients whose heart has stopped and they have not stayed awake one minute. Tr. 1243. Notably, Dr. Yen acknowledged as well that he lacked the expertise to opine on how long it would take for a prisoner executed by firing squad to lose consciousness but the period he proposes is “seconds” and as few as “five seconds.” *Id.*

19. Dr. Yen is not on faculty at any university. Tr. 1245. He is not a board-certified anesthesiologist because he failed the oral board exams for certification twice. Tr. 1246. Dr. Yen is a politician, having served as a State Senator and he was at the time of trial a candidate for Governor. Tr. 1246. As a State Senator, Dr. Yen supported nitrogen hypoxia as an execution method, which he believes results in death without asphyxiation caused by the buildup of carbon dioxide. Tr. 1247. By contrast, Dr. Yen confirmed that asphyxiation when subject to the Protocol causes pain and suffering. Tr. 1247.

20. Dr. Yen’s principal opinion that midazolam is sufficient to induce and maintain general anesthesia or at a minimum to provide a state of deep sedation in which

---

<sup>6</sup> Applying the potency conversion factor endorsed by Dr. Yen, the midazolam equivalent range for the awake patient 7 of *Divoll* includes or is greater than the midazolam blood levels for John Grant, Pl. Ex. 803 at 18373 (2200 ng/ml), and Bigler Stouffer, Pl. Ex. 807 at 18406 (1600 ng/ml).

the pain and suffering of the Protocol is not felt is classic *ipse dixit*. In contrast, to Dr. Yen, Dr. Antognini, when presented with the hypothetical by the Court as to whether he would tell a surgeon to begin to cut based on induction with midazolam alone, testified “I might say ‘go ahead’ if it was short ... where it was going to literally take 30 seconds.” Tr. 648-49. Dr. Yen’s unqualified opinions that midazolam alone is effective to protect the prisoners subject to the Protocol for 12-15 minutes or longer<sup>7</sup> from the Protocol’s severe pain and suffering evidences bias and a disregard of the scientific studies on midazolam.

---

<sup>7</sup> In Ron Smith’s Alabama execution, using the same three-drug protocol, a second 500 mg dose of midazolam was administered, as also provided for in the Protocol, and that execution lasted a little over 30 minutes. 10/25/21 PI Tr. 46.

**III. PROPOSED FINDINGS OF FACT BASED ON  
FACT WITNESS TESTIMONY**

The following are proposed findings of fact based on the testimony of fact witnesses Spencer Hahn, Julie Gardner, Meghan LeFrancois, Scott Crow and Justin Farris:

**A. The Executions of Alabama Prisoners Willie B. Smith III and Ron Smith**

1. Spencer Hahn (“Hahn”) is an Assistant Federal Public Defender with the Capital Habeas Unit of the Federal Public Defender’s Office for the Middle District of Alabama. 10/25/21 PI Tr. 29.

2. Alabama utilizes a three-drug execution protocol, including midazolam, rocuronium bromide, and potassium chloride. *Id.* at 33; Pl. Ex. 1-2 at 9. Under the Alabama protocol, a consciousness check is conducted after the administration of 500 milligrams of midazolam. *Id.* at 33.

3. Hahn witnessed the execution of Alabama death-row prisoner Willie B. Smith III (“W. Smith”) on October 21, 2021. *Id.* at 34. Hahn observed W. Smith’s execution from an observation room outside of the execution chamber situated to W. Smith’s left side. *Id.* at 35. Hahn sat approximately six feet from W. Smith’s left arm. *Id.* at 35. Hahn observed an IV line running from W. Smith’s left arm to a control room behind a wall in the execution chamber. *Id.* at 35. Nothing obstructed Hahn’s view of W. Smith. *Id.* at 36.

4. W. Smith was restrained at each wrist, between the elbow and shoulder on each arm, and over the chest with crisscrossing straps. *Id.* at 36-37. A sheet was wrapped around his lower extremities, which were also strapped down. *Id.* at 37.

5. After the execution chamber curtain was raised, the Warden entered the chamber and W. Smith had an opportunity to give his last words. *Id.* at 37. The Warden then left the chamber for a minute or two and nothing happened. *Id.* at 37.

6. Next, Hahn observed W. Smith's left arm jerk inward, as if trying to go toward his body, which was impossible because it was strapped down in two places. *Id.* at 38. Almost immediately thereafter, W. Smith's torso bucked up twice, as if he were trying to sit up from the gurney, and his breathing became labored, like a fish out of water. *Id.* W. Smith was gasping and attempting to inhale as much as he could; his chest became very large. *Id.*

7. Hahn observed this fish-out-of-water breathing continue until the administration of the paralytic, which followed the consciousness check. *Id.* at 39. The consciousness check occurred approximately three to five minutes after the administration of midazolam. *Id.*

8. Hahn observed the following three-step consciousness check of W. Smith: 1) announcing the prisoner's name close to his face; 2) brushing the prisoner's eyelid; and 3) pinching the prisoner's upper arm. *Id.* at 39-40. W. Smith did not appear to react to any of these actions. *Id.* at 40. Hahn observed W. Smith's labored breathing continue consistently through the entirety of the consciousness check. *Id.* at 39.

9. Hahn estimates that four to six minutes passed from the time W. Smith began to have labored breathing to the time such breathing stopped. *Id.* at 40. Approximately eight to ten minutes elapsed between when W. Smith stopped any observable movements

to when the curtain in the execution chamber was closed. *Id.* Mr. W. Smith's execution took approximately 20 to 25 minutes. *Id.*

10. In December of 2016, Hahn observed the execution of Alabama death-row prisoner Ron Smith ("R. Smith"). *Id.* The same execution drugs were used in R. Smith's execution as were used in W. Smith's execution – 500 milligrams of midazolam, followed by rocuronium bromide, and potassium chloride. *Id.* at 41.

11. Hahn observed R. Smith's execution from the same position as he observed W. Smith's execution. *Id.* at 43. Nothing obstructed Hahn's view of R. Smith's execution. *Id.* R. Smith was strapped to the gurney in the same manner as W. Smith. *Id.* IV tubing ran from R. Smith's left arm into the wall. *Id.*

12. Shortly after the administration of midazolam began, Hahn observed R. Smith's left arm jerk inward toward his body, as if he were trying to pull it in close. *Id.* at 44. R. Smith then bucked upward several times and began to have labored, fish-out-of-water breathing. *Id.* R. Smith was asthmatic. *Id.* During the execution, Hahn heard R. Smith cough. R. Smith's cough sounded like a dry, barking cough, almost like a seal. *Id.*

13. After the dose of 500 milligrams of midazolam was administered in R. Smith's execution, a prison official performed a consciousness check. *Id.* First, the prison official called out "Inmate Smith" three times; R. Smith did not appear to react. *Id.* Next, the prison official used eyelid stimulation; R. Smith did not appear to react. *Id.* at 45. Finally, the prison official pinched the back of R. Smith's shoulder; R. Smith reacted to the pinch by moving his arm to the left. *Id.*

14. After the consciousness check, a second dose of 500 milligrams of midazolam was administered to R. Smith. *Id.* Initially after the second dose, R. Smith calmed briefly, but he resumed his heavy breathing and gasping and barking for air. *Id.* at 45. Three to five minutes passed until another consciousness check was performed by using the same three methods as the first consciousness check. *Id.* Hahn observed movement after the third step of the consciousness check. *Id.* R. Smith continued to gasp for air throughout the second consciousness check. *Id.* at 46.

15. After the second consciousness check of R. Smith, the paralytic was administered. *Id.* R. Smith's chest stopped moving, and he stopped coughing. Three to five minutes later, the curtains to the execution chamber closed. *Id.* Hahn estimates R. Smith's execution lasted a little over 30 minutes. *Id.*

## **B. The Execution of John Grant**

1. Julie Gardner ("Gardner") is an investigator with the Capital Habeas Unit ("CHU") of the Federal Public Defender's Office for the Western District of Oklahoma. 1/10/22 PI Tr. 5. Gardner has held this position for almost 15 years. *Id.* Meghan LeFrancois ("LeFrancois") is an Assistant Federal Public Defender with the CHU. *Id.* at 24. LeFrancois has held this position since September 28, 2018. *Id.*

2. On October 28, 2021, LeFrancois and Gardner observed the execution of Oklahoma death-row prisoner John Grant ("Grant") at Oklahoma State Penitentiary ("OSP"). *Id.* at 25; Doc. 551-1, ¶ 1. Gardner and LeFrancois witnessed Grant's execution from the viewing room outside of the execution chamber. *Id.* at 6; 26. They sat on the front row of the viewing room, approximately nine feet away from Grant throughout the

execution. *Id.* at 6. Nothing obstructed their view of Grant. *Id.* at 6; 7. Both Gardner and LeFrancois wore a stopwatch during Grant's execution. *Id.* at 7; 28.

3. After the execution chamber curtain was raised, Gardner and LeFrancois observed Grant strapped to a gurney on his back. Doc. 551-1, ¶ 3; *Id.* at 10; 27. Almost immediately after the curtain was raised, a Department of Corrections ("DOC") employee, who was standing next to Grant in the execution chamber, began reading the death warrant over a microphone. *Id.* at 7; 28.

4. Gardner began her stopwatch after the microphone was cut off and the DOC employee walked towards Grant's feet. *Id.* at 8. After Gardner began her stopwatch, 30 to 40 seconds elapsed before she and LeFrancois noticed drugs flowing through the IV line inserted in his left arm. *Id.* at 8; 28; Doc. 551-1, ¶ 3.

5. Immediately after Gardner observed the first round of drugs flowing through Grant's IV line, Grant appeared peaceful. *Id.* at 9; Doc. 551-1, ¶ 6. LeFrancois observed Grant lift his head, open his eyes, look towards his feet, put his head back down, and close his eyes. *Id.* at 29. After 15 seconds, Grant took in a deep breath and his chest expanded. Grant's mouth started to gulp like he was a fish out of water. *Id.* at 9. Grant's breathing became very labored; he was gasping for air and started coughing. *Id.* at 30. LeFrancois observed Grant's back lift off the gurney shortly after she saw the first round of fluids flowing through his IV line. *Id.* at 31. Grant then began to vomit. *Id.* at 9. Grant continued to gasp for air while vomiting. *Id.* at 10.

6. While Grant was vomiting and trying to breathe, he remained strapped to the gurney, and he was unable to move his body to the side. *Id.* at 10. Grant turned his head to

the right. Gardner and LeFrancois observed vomit all over his face, neck, and shoulders. *Id.* at 10; 31. LeFrancois and Gardner observed that Grant appeared to be choking on his own vomit. *Id.* at 31-32.

7. Grant's arms were strapped down, and a large black strap about one inch below Grant's armpit restrained him to the gurney. *Id.* at 12-13; Pl. Exs. 97 & 98 (photographs of execution gurney) admitted at January 10, 2022 Motion for Preliminary Injunction hearing.<sup>8</sup> The approximately four-inch strap covered Grant's sternum. *Id.* at 13.

8. Gardner observed vomit bubble up in Grant's mouth; some of the vomit bubbles popped, while others got sucked back in. *Id.* at 14. At the same time as he was vomiting, his labored breathing continued, and he gasped for air. *Id.* at 14. Grant continued to vomit and gasp for air for approximately four minutes. *Id.* at 14.

9. After approximately four minutes of Grant's vomiting, Gardner and LeFrancois observed a man and woman enter the execution chamber. *Id.* at 15; 32. The woman began scooping vomit from Grant's face, neck, and mouth with a towel. *Id.* at 15. The man also began cleaning vomit from Grant. *Id.* at 15. They continued to clean vomit from Grant for approximately 40 seconds. *Id.* at 15. The man and woman who entered the execution chamber appeared nervous and hurried; the man's hands were visibly shaking. Doc. 551-1, ¶ 7.

10. After the man and woman exited the execution chamber, Grant continued to gasp for air and continued to vomit a substantial amount of brown substance. *Id.* at 15; 32;

---

<sup>8</sup> Ultimately, these exhibits were not admitted during trial and different items were listed as 97 and 98 on Plaintiffs' Trial Exhibit List (and not admitted).



Doc. 551-1, ¶ 8. The vomit covered Grant's face and neck and fell to the floor. *Id.* at 32; 33.

11. About six minutes into the execution, the man and woman reentered the execution chamber and again wiped the vomit off of Grant's face. *Id.* at 33. When the man and woman entered the execution chamber the second time, Gardner observed Grant raise his head and move it from the right to the left; at the same time, his left shoulder came up from the gurney. *Id.* at 16. Gardner and LeFrancois then observed the man take Grant's face, turn it straight, take Grant's glasses off, and wipe more vomit from Grant's face. In the process of doing so, the man turned Grant's face toward LeFrancois; she observed what appeared to be brown vomit bubbling up in Grant's nose. *Id.* at 33. The man and woman then left the execution chamber at approximately seven minutes into Grant's execution. *Id.* at 18.

12. Neither Gardner nor LeFrancois observed anyone in the execution chamber do anything to assess Grant's consciousness, including the following: use verbal stimuli; use painful stimuli, including a trapezoid pinch or a pinch between Grant's fingers; apply suborbital pressure; apply sternal pressure or a sternal rub; apply pressure to Grant's nailbeds; check pupils; or check corneal reflex by brushing the eyelid or touching the cornea. *Id.* at 17-18; 33-34. Nor did Gardner observe anyone trying to get his or her hands on, around, or under the black, wide strap that covered Grant's sternum. *Id.* at 18.

13. After the man and woman exited the chamber the second time, approximately seven minutes into the execution, LeFrancois observed Grant vomit one more time; the vomit was more liquid-like than before. *Id.* at 34. Next, Gardner and LeFrancois heard an

announcement that Grant was unconscious, despite the fact that they saw no consciousness check performed. *Id.* at 18; 34.

14. Gardner then noticed more fluid moving through the IV line inserted into Grant. Grant's breathing became less labored, and he exhaled approximately 10 to 15 seconds after Gardner observed this second round of fluid flowing. *Id.* at 18. Gardner and LeFrancois observed Grant's cheek flutter and his mouth opened; his chest settled. *Id.* at 19; 34.

15. Roughly five minutes later, Grant was declared dead. Grant's execution lasted approximately 12 minutes and forty seconds. *Id.* at 19.

16. In her capacity as an investigator with the CHU, Gardner has witnessed seven executions, including six executions of Oklahoma death-row prisoners at OSP and one execution of a federal death-row prisoner. *Id.* at 5-6. Of the seven executions Gardner has witnessed, Grant's was the only one that involved the use of midazolam. *Id.* at 6.

17. Of the seven executions Gardner has witnessed, Grant's was the only execution in which the prisoner vomited, gasped for breath, and had labored breathing. Other than Grant's execution, the other prisoners whose executions Gardner observed appeared simply to have fallen asleep. With the exception of the federal execution Gardner observed, Grant's was the longest in duration. *Id.* at 21.

**C. The ODOC Director Has Unfettered Discretion To Modify The Execution Protocol.**

1. Oklahoma Department of Corrections ("ODOC") OSP Policy No. OP-040301, Execution of Offenders Sentenced to Death, effective February 20, 2020 (the

“Execution Protocol”) affords the ODOC Director the unilateral and unfettered discretion to “deviate” from or “adjust” any of the “procedures” set forth in the Execution Protocol if the ODOC Director determines that a deviation or adjustment in those procedures is “required.” Pl. Ex. 45 at 1.

2. “Required” is not defined anywhere in the Execution Protocol, and the discretion afforded to the ODOC Director is not limited or circumscribed in any other way. *Id.*; see also Tr. 1059-1060. The ODOC’s Director’s discretion to “deviate” or “adjust” the provisions of the Execution Protocol, Pl. Ex. 45 at 1, extends to all aspects of the Execution Protocol, Tr. 1059, including, for example, modifying or even eliminating any of the critical elements of the Execution Protocol that are specifically designed to protect the prisoners and ensure that their executions do not violate constitutional rights, including, for example, consciousness checks can be eliminated or altered, execution teams can be selected without regard for experience or background, and training can be limited or dispensed with entirely.

3. Defendants have not identified any legitimate penological justification for the ODOC Director to retain discretion to change the Execution Protocol any time he or she determines in his or her unilateral discretion that it is “required.” The ODOC Director’s discretion to “deviate” or “adjust” any of the provisions of the Execution Protocol renders them illusory and meaningless.

4. The discretion afforded to the ODOC Director is inconsistent with the stated goal of the Execution Protocol. The Execution Protocol expressly states that the “ODOC ensures the execution of a person sentenced to death under state law ....is carried out in

keeping with statute, case law and professional practices[.]” and that one of ODOC’s “responsibilities” is to “make every effort in the planning and preparation of an execution to ensure that the execution process...[f]aithfully adheres to constitutional mandates against cruel and unusual punishment[.]” Pl. Ex. 45 at 2, Section II.A.1. The discretion afforded to the ODOC Director is inconsistent with these stated goals. That unfettered discretion creates the possibility that executions will be carried out in something other than a humane and constitutional manner, and, importantly, makes it impossible to evaluate whether ODOC will carry out executions as the Execution Protocol intends.

5. Director Crow’s testimony that the discretion afforded by the Execution Protocol is limited by the chain of command, Tr. 1060, misses the point. Although Director Crow reports to the Governor and the Secretary of Public Safety, that reporting relationship does not limit the Director’s discretion, but, at best, means that others might participate in decisions to deviate from the Execution Protocol. Moreover, the fact that there might be after-the-fact consequences, e.g., termination, for the Director’s exercise of his discretion, would obviously be irrelevant to the person who has already been executed in a constitutionally impermissible manner. Tr. 1060-61. In addition, although the Director was confident that the Governor or the Secretary of Public Safety would intervene if he was not following the Execution Protocol, *Id.* at 1051, the Director’s confidence is dubious given that neither the Governor nor the Secretary are present at the executions and thus not in a position to take remedial action and because neither the Governor nor the Secretary has seemingly taken any action in relation to ODOC’s serious failure to follow the terms of the

Execution Protocol (discussed below) and properly label the shadow board with the correct execution drug.

6. Finally, as one of the individuals responsible for development of the Execution Protocol, *Id.* at 1057, Director Crow and his team, which included ODOC's General Counsel, *Id.* at 1957, could have defined "required," or otherwise placed limitations on the exercise of the ODOC Director's discretion, and did not do so. Director Crow and his team failed to do so despite touting the "expansion" of the definitions in the Execution Protocol as one of the ways in which it "improved upon the old execution policy", Tr. 1043, and despite the fact that the Interim Grand Jury Report found both that the lack of definitions in the prior protocol and the discretion afforded to the ODOC Director contributed to the issues with the executions of Mr. Warner and the scheduled execution of Mr. Glossip. Tr. 1063; Pl. Ex. 597 at 1, 79, 83. Logically, therefore, the failure to include a specific definition of "required" or otherwise constrain the ODOC Director's discretion was intentional and designed to afford the ODOC Director entirely discretionary authority to change the provisions of the Execution Protocol.

**D. The "Consciousness Check" in The Execution Protocol Is Illusory.**

1. The Execution Protocol provides that "[w]hen approximately five (5) minutes has elapsed since commencing the administration of the first chemical [midazolam], the IV Team Leader...shall enter the room...to physically confirm the inmate is unconscious by using all necessary and medically-appropriate methods." Pl. Ex. 45, Attachment D, Section H.3.

2. That provision (like all others in the Execution Protocol) can be “adjusted” or “deviated” from at the unilateral discretion of the ODOC Director. In other words, the ODOC Director has the entirely discretionary authority to weaken, water down, or eliminate the protections inherent in the consciousness check, *i.e.*, to ensure the prisoner is insensate when the execution drugs are being delivered, or to wink at its results.

3. The Execution Protocol does not provide any detail, requirements, or explanation concerning the “necessary and medically-appropriate methods” that will be used by the IV Team Leader to “confirm the inmate is unconscious.” *Id.* To the contrary, according to Director Crow, the IV Team Leader determines what all necessary and medically appropriate methods are during an execution. Tr. 1063. However, because there is no baseline standard for the consciousness check written into the Execution Protocol, the methodology used by the IV Team Leader to “confirm the inmate is unconscious” could change from execution to execution depending on the personnel and the prisoner. *Id.* at 1067. The absence of a baseline standard in the Execution Protocol means that the ODOC Director cannot rely on the language in the Execution Protocol to evaluate whether the IV team leader is doing things in an appropriate manner, rendering any putative safeguard against an inhumane execution provided by the consciousness check illusory. Moreover, given that the ODOC Director has no medical training, Tr. 1033-1034, even his good faith judgment that the IV team leader is conducting the consciousness check in an appropriate manner is fraught with risk.

4. Although the Execution Protocol provides that the IV Team members be either physicians, physician assistants, nurses, EMTs, paramedics or militarily trained

medical personnel currently certified or licensed in the United States, Pl. Ex. 45 at IV.C, nothing in the Execution Protocol requires that the IV Team leader to have a background in anesthesiology or pain management. Tr. 1063. In any event, for the reasons noted above, the Director retains the unfettered discretion to eliminate those provisions and insert someone as IV team leader who lacks any appropriate credentials, let alone those set forth in section IV.C of the Execution Protocol. Moreover, as Director Crow acknowledged, even if his “preference” is for the IV team leader to be a physician, the ODOC Director serves at the pleasure of the Governor, the Governor can remove and replace the ODOC Director at any time, and the new ODOC Director’s preference would guide the determination of who will be the IV Team leader. Tr. 1062.

**E. ODOC Has Demonstrated Its Inability to Adhere to the Execution Protocol.**

1. The Execution Protocol provides that “after the IV Team prepares all required syringes with the proper labels....[t]he syringes shall be attached to the 3-Gang, 2-Way manifold ...with each syringe resting in its corresponding place in the shadow board which is labeled with the name of the chemical, color, chemical amount and the designated syringe number.” Pl. Ex. 45 at Attachment D, section D.3. In addition, “after all syringes are prepared and affixed to the 3-Gang, 2-Way Manifold in proper order, the Special Operations Team leader shall confirm that all syringes are properly labeled and attached to the manifold in the order in which the chemicals are to be administered as designated by the Chemical Chart.” *Id.* at section D.5.

2. As Director Crow confirmed, the entire point of placing labels on the shadow board to match the labels on the syringes is to have a system of checks and balances to

ensure that the mistake of Mr. Warner's execution (where the incorrect execution drug was used) is not repeated. Tr. 1068. Director Crow acknowledged that his goal in developing the Execution Protocol was to address the root causes of the circumstances that led to the issues with the execution of Mr. Warner (and the scheduled execution of Mr. Glossip) and ensure that those issues were not repeated. *Id.* at 1058.

3. Despite the requirements of the Execution Protocol, the labels for the paralytic on the shadow board and syringe did not match for at least two of the four recent executions (Messrs. Postelle and D. Grant). Pl. Ex. 837 at 22460 (pictures from execution of Mr. Postelle); Tr. 1038 (Director Crow testifying that he became aware that the sticker on the shadow board showed "rocuronium" "approximately a week or so after the last execution"). Specifically, the label on the syringe reflected "vecuronium bromide" while the corresponding label on the shadow board reflected "rocuronium bromide." *Id.* Although Director Crow was unaware whether the shadow board sticker remained the same for Mr. Stouffer's execution in December, *Id.* at 1070, he was aware that the label on the shadowbox for Mr. Donald Grant's execution also misidentified the paralytic as "rocuronium bromide." *Id.* at 1071.

4. That ODOC would make these mistakes, given the history of prior executions and the stated purpose of this requirement, demonstrates that ODOC has not learned from the mistakes of the past, cannot be relied upon to comply with the terms of the Execution Protocol, and that there remains a substantial risk (especially once the spotlight of this litigation has faded) that the horrific mistakes of the past can and will be repeated.



**F. The Evidence Demonstrates That The ODOC Training Has Been Inadequate.**

1. Section V of the Execution Protocol states that the “agency will establish protocols and training to enable staff to function in a safe, effective and professional manner before, during and after an execution.” Pl. Ex. 45 at 8, Section V. However, the Execution Protocol does not include any training protocols.

2. Both Messrs. Farris and Crow touted the training ODOC engaged in prior to the recent executions. *See, e.g.,* Tr. 993 (Harris); 1043 (Crow).

3. Whatever the number or frequency of training sessions provided by ODOC to execution team members, the fact that the wrong label was affixed to the shadow board for multiple executions demonstrates that the training was demonstrably insufficient and cannot provide any assurance that executions will be conducted in accordance with the Execution Protocol.

**G. ODOC Can Conduct Executions By Firing Squad.**

1. Execution by firing squad is statutorily authorized in Oklahoma. ODOC has what it needs, Tr. 1055-1057, and no penological justification for refusing to administer executions by firing squad has been identified by Defendants.

**H. ODOC Has Not Demonstrated Reasonable Efforts To Locate Fentanyl or Pentobarbital.**

1. ODOC did not make reasonable efforts to locate a fentanyl or pentobarbital source. Mr. Farris testified that he contacted only one potential supplier of fentanyl, Tr. 1002, and could not recall the number of Oklahoma pharmacies ODOC contacted out of its “target” of “roughly 10 percent of the pharmacies.” *Id.* at 1003.

Dated: May 9, 2022

Respectfully submitted,

s/ Emma V. Rolls

Emma V. Rolls, OBA # 18820  
Office of the Federal Public Defender  
for the Western District of Oklahoma  
215 Dean A. McGee Ave., Suite 707  
Oklahoma City, OK 73102  
Telephone: (405) 609-5975  
Emma\_Rolls@fd.org

Harry P. Cohen (admitted *pro hac vice*)  
Michael K. Robles (admitted *pro hac vice*)  
James K. Stronski (admitted *pro hac vice*)  
Adam Singer (admitted *pro hac vice*)  
Kenton Walker (admitted *pro hac vice*)  
Anne Li (admitted *pro hac vice*)  
CROWELL & MORING LLP  
590 Madison Avenue  
New York, NY 10022  
Telephone: (212) 223-4000  
hcohen@crowell.com  
mrobles@crowell.com  
jstronski@crowell.com  
asinger@crowell.com  
kentwalker@crowell.com  
ali@crowell.com

Jon M. Sands  
Federal Public Defender District of Arizona  
Jennifer M. Moreno (CA Bar No. 244967)  
850 West Adams Street, Suite 201  
Phoenix, Arizona 85007  
Telephone: (602) 382-2816  
Facsimile: (602) 889-3960  
jennifer\_moreno@fd.org

COUNSEL FOR PLAINTIFFS

Alex Kursman  
Lynne Leonard

Assistant Federal Defenders  
Capital Habeas Unit  
Federal Community Defender Office  
for the Eastern District of Pennsylvania  
601 Walnut Street  
Philadelphia, PA 19106  
Telephone: (215) 928-0520

COUNSEL FOR PHILLIP HANCOCK

**CERTIFICATE OF SERVICE**

I hereby certify that on this 9<sup>th</sup> day of May, 2022, I electronically transmitted the attached document to the Clerk of Court using the ECF System for filing and transmittal of Notice of Electronic Filing to all counsel of record who are registered participants of the Electronic Case Filing System.

s/ Emma V. Rolls